

FRIDAY, OCTOBER 15, 1897.

## CONTENTS

ILLUSTRATIONS:	PAGE.	GENERAL NEWS.	PAGE.
The Cascade Switchback and Tunnel of the Great Northern.....	716	Locomotive Building.....	734
Recent Improvements on the Baltimore & Ohio.....	718	Car Building.....	734
The Harrington Rail Bonds.....	721	Bridge Building.....	734
Pfasterer's Combined Switch and Distant Signal Movement.....	722	Railroad Law.....	734
Peckham's Swivel Trucks for High-speed Electric Service.....	723	Meetings and Announcements.....	734
The Belfast Gas Engine Plant.....	728	Persons.....	735
The Jackson & Sharp "Duplex" Car.....	729	Elections and Appointments.....	735
Wagon Roads with Steel Wheel Tracks.....	730	Railroad Construction.....	736
An Improved Concrete Mixer.....	730	Electric Railroad Construction.....	737
CONTRIBUTIONS:		General Railroad News.....	737
Expansion of Brick Pavements.....	715	Electric Railroad News.....	738
The Government Armor Plate Works.....	715	Traffic.....	738
The Brakeshoe Testing Machine.....	715	MISCELLANEOUS:	
The Railroads of New South Wales.....	726	Technical.....	730
English Railroad Accidents in 1896.....	726	The Scrap Heap.....	732
The Enforcement of the Federal Coupler Law.....	727	Economy in Electric Car Control.....	715
Annual Reports—Northern Pacific.....	727	The American Railway Association.....	717
EDITORIAL NOTES.....	726, 728	Wood Screws and Spikes for Railroad Track Use.....	717
		Progress in Some Details of Electric Railroads.....	719
		Printing Presses Driven by Electric Motors.....	721
		Pneumatic Mail Tubes in New York.....	724
		Regulations for the Use of Interlocking Switches and Signals.....	724
		Rules for the Operation of Interlocking Plants.....	725
		Exports of Electrical Machinery.....	725
		A Correspondence School of Locomotive Engineers and Firemen.....	728
		Malleable Iron in Car Construction and Repairs.....	729
		Long Locomotive Runs on the Missouri Pacific.....	730

## Contributions.

## Expansion of Brick Pavements.

NEWARK, N. J., Oct. 9.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the question of the noise incident to brick pavements, I would state first that it is a fact, and that it comes from two causes, expansion due to the direct heat in summer, and expansion due to the freezing in the winter. This may seem anomalous, but I will explain further.

The expansion due to direct heat is such an accepted fact that specific precautions are being taken to offset it by decreasing the crown; by laying the brick on a cushion of sand on the concrete; by inserting a mastic joint where the pavement meets the curb. This mastic joint has been further used on intermediate joints and also in lines at right angles to the range of the street. The application of these remedies has so far in this city (Newark) obviated the trouble, but as only a year has elapsed the results are still tentative.

The other cause, that of expansion in winter, arose from the fact that the brick was not laid on concrete but merely a layer (probably very thin) of sand. The raising of the ground during cold weather carried the pavement with it, but in the settlement in the spring, the pavement, being of an arched construction, remained at the same height, and space was left between the sand and brick, which caused the hollow sound. In confirmation of this the arch pavement, being too light to carry the load, broke, and the brick were crushed at the exact theoretical point they should be. The crushed brick were taken out and others substituted. The pavement was laid late in the fall and the rumbling noise was apparent the following spring. JAS. OWEN.

## The Government Armor Plate Works.

Southern Railway Company,  
BIRMINGHAM, Ala., Oct. 4.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Oct. 1 (page 683), "O. H. S." seems to be deeply concerned about the location of the armor plate factory, presumably to be built by the government. He charges Representative Livingston, of Georgia, with ignorance and impudence for having stated that the Bethlehem and Carnegie people bought pig iron from Southern manufacturers. In this he is mistaken. Colonel Livingston knows whereof he speaks, and is not given to making erroneous statements through ignorance. As to the "patriots and economists" from New York and Nevada, we know very little, but appreciate anything they may have said in our favor, believing it to have been from purely patriotic and economical motives.

We are expecting the committee here on the 18th inst., and would be glad to have "O. H. S." come along (there will be no demonstration whatever), and make some investigation as to our resources, facilities for doing business, and our climate. We can show, I believe, that "very pure Swedish" pig iron can be delivered here as cheaply as elsewhere, and furthermore that there is no reason why the government should not pay as much for its skilled labor here as elsewhere and that skilled labor can live here as cheaply and as comfortably as elsewhere. There is no place in the country, that we know of, where skilled labor is lying idle, waiting for the erection of this armor plate factory, and further, there is no place in the country, that we know of, that has a monopoly of "very pure Swedish" pig iron.

If these are the only reasons against us, and as we assume there is a certain amount of earnestness in the

move, we feel almost certain the armor plate factory will be located here, as we have so many other things in our favor.

B. C. MILNER, JR.

## The Brakeshoe Testing Machine.

CHICAGO, Oct 11, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I note your editorial in the issue of Oct. 8 in regard to moving the M. C. B. brakeshoe testing machine from Wilmerding to the Purdue University. I am strongly in favor of such action, as the machine in the hands of Professor Goss will be made extremely useful. The M. C. B. tests made at Wilmerding are very valuable, but they are incomplete, as they do not show the changes which take place in the metal in some of the shoes, due to excessive heating in long applications, and the consequent effect on the tire.

New brakeshoes are being brought to notice from time to time, and it is important that each one of them be put to the test and made to show its value before going into service, and the test should do more than simply show great endurance or high friction, or any one of the requisites in a brakeshoe (friction, durability and effect on tire)—the test should show all of these points, and the only way to get at them all in a sure way is to put the shoe on the machine and run it long enough to demonstrate all the points.

The machine can be made useful in testing the comparative friction of metals and compositions used in journal bearings, or the friction which occurs between bearing surfaces when the oil is forced out, and metallic contact occurs. It would seem clear that the ideal anti-friction metal would be the one which gives the minimum friction and consequent heating in unlubricated contact, and hence the poorest brakeshoe would be the best journal bearing.

Professor Goss, with his corps of students, is better able to take up these questions and to work them out to a satisfactory conclusion than anyone engaged in a manufacturing business. By all means let us have the M. C. B. brakeshoe testing machine placed in Professor Goss' hands, where it will be in continuous operation, and where all questions regarding brakeshoes in particular can be readily settled.

F. W. SARGENT.

## Economy in Electric Car Control.\*

The item of motive power is usually but a small part of the operating expense of a road. Still a reduction in the cost of motive power involves less risk of loss in other directions than reduction in most other departments, and the same may be said of the repair and maintenance department. The most fruitful sources of loss in power and repairs in the past have been inefficient power plants, poor return circuits, and motors and controllers of a design not suited to railroad work. These have been improved, but there remains once chance for economy about which very little has been said, and that chance is in the operation of the controller. There is, on the majority of roads to-day, a waste of power due to improper operation, worth considering from the standpoint of power alone, to say nothing of the repair department.

On nearly all electric roads the service is of such a character as to require frequent stopping and starting. If a motorman could run his car from one end of the road to the other by simply putting his controller full on and leaving it there, there would be no chance for either waste or economy, but frequent stops make it possible to waste power in several ways, principally by turning on the current too rapidly in starting and in wasting an unnecessary amount of energy in the brakes.

To operate a car or train between two stops in a given time, the ideal economy would be secured were we able to accelerate and stop in an infinitely short space of time, as we could then perform the same service with lower maximum speeds; but when we attempt to get rapidity of acceleration beyond a certain point, we give rise to a number of sources of loss which more than make up for the gain that results, and it is the constant tendency of motormen to overstep this limit and turn on the current too fast for the best efficiency.

The loss in the electrical conductors in the circuit (this includes power-house generators, feeders, trolley lines and ground return) varies with the square of the current flowing. On this account the motorman who uses the heavy starting current, even though he uses it for a proportionately shorter time, consumes more energy to get this car up to speed than the one who draws his power at a slower rate.

When a car is equipped with series parallel controllers there is another chance for waste of power in starting by throwing the motors in multiple before they have attained nearly their full speed in series. When the motors are in series the torque per ampere drawn from the line is double what it is when they are in multiple. It is torque per ampere that determines the efficiency of the motors as car accelerators. Consequently to get the full benefit of the efficiency of a series parallel controller as a car accelerator the full use must be made of the series combination of motors. Up to half speed the series parallel controller affords a means of accelerating a car with but half the current required by a plain multiple controller, but if a motorman skips over the series points and into multiple with scarcely a pause he is throwing away half the power he uses during a part of the process of acceleration, and the car might as well be equipped with the old wasteful parallel controller.

\* Abstract of a paper read before the Chicago Electrical Association, Oct. 1, 1897, by Mr. J. R. Cravath, President Cravath Manufacturing Company and formerly Electrical Editor *Street Railway Review*.

Very many motor equipments now are provided with a shunt around the field coils which is intended to be cut in to weaken the fields, so as to increase the speed after full speed has been attained by the motors with fully excited fields. The common practice of motormen is to cut in this shunt when starting. Weakening the fields at such a time lowers the torque per ampere that can be obtained from the motors and consequently the efficiency.

It may also be mentioned that since the energy lost in heating the motors is proportional to the square of the current, the larger current used with the quicker start not only heats them more, so as to endanger the insulation, but heats them so as to sometimes very materially lower their speed and efficiency.

It has been maintained by some that the resistance should be cut out as rapidly as possible in starting in order to avoid the loss of energy in the resistance. While it is true that it is possible to waste energy by continuing to keep in resistance after a car has attained speed on a point, the unnecessary waste of energy in resistance during actual acceleration is more imaginary than real; first, because it is hard to find a man who will keep the resistance in too long if the time table is as fast as it should be, and second, because mathematical calculation shows that the resistance introduced during acceleration is necessary loss which cannot be eliminated by too rapid controller handling.

The opportunities for a motorman to save power by allowing the car to drift with the current off, thereby using the energy stored up in the car at the time of acceleration, are evident even to the layman. When a car has been brought up to speed it has a momentum which must be overcome by the brakes as soon as the car has to stop. The less energy, therefore, a motorman has to overcome in the brakes in maintaining a certain time, the more economical he is as a car operator. The amount of drifting he can do depends, of course, on the schedule and the traffic, but under conditions as they exist to-day, a great deal of energy is wasted in the brakes unnecessarily.

The commercial effect of too rapid turning on of current in starting a car is well illustrated by the results of a number of tests made by Mr. Knox, Electrical Engineer of the Chicago City Railway, in 1895. In one set of tests the controller was put at the top notch in four seconds and 307,176 watt-seconds were used in acceleration, speed being attained in  $9\frac{1}{2}$  seconds. In the other series the controller was put at the top notch in 10 seconds and 221,676 watt-seconds were used in acceleration, speed being attained in 12 seconds. The maximum drop in voltage was 80 in the first case and 20 in the second. Now since in city service, according to good authorities, the energy used in acceleration is about 75 per cent. of the total energy used by the road, it can be seen how important a bearing it has on the total power consumption to properly handle the controller in starting so as not to waste power. It will be seen that an economical start does not necessarily mean a very slow one, but simply that it requires a little care in advancing the controller.

A Chicago road which is equipped with a device\* designed by the writer to check the use of excessive starting current by motormen, recently made a saving in coal between 15 and 29 per cent., performing exactly the same service; by the use of the instrument the maximum load at the power house was reduced about 25 per cent. This is the result of keeping an individual record of excessive current consumed by each man, and shows the difference between care and carelessness in controller handling. Some tests I have in my possession made by the officers of a road operating a very heavy high-speed class of electric service show the difference between the various methods of acceleration. The tests made covered simply train acceleration. Readings were taken at two-second intervals from the time each start was begun until the ammeter indicated that full speed was reached.

In one set of tests eight consecutive starts were made by a regular motorman who was one of the most competent on the road, and was doing his best to make a good showing. Plain rheostat control was employed. The maximum currents he used varied between 300 and 210 amperes, the average of the maximum of the eight starts being 262.5 amperes. The average ampere seconds used per start were 6,814, and the average time per start 54 seconds. This was thought to be a very good record, and indeed it was as compared with the practice of many men on the same road; but on the same trip and under the same conditions another man who had been able to give the matter a more intelligent study made six consecutive starts averaging 50 $\frac{1}{2}$  seconds per start with maximum currents ranging from 200 amperes to 100 amperes. The watt seconds used per start averaged 5,794 and the average of the maximum currents used was 185 amperes.

Tests on the same road, including 129 starts with a somewhat lighter train, all tended to confirm the conclusions from the results of the tests just mentioned, viz., that higher maximum starting currents were being commonly used than there was any necessity for, and that the men using the highest maximum starting currents did not necessarily get the quickest or most efficient acceleration, the contrary very often being the case. Thus one run was made with 12 stops on which the average time per start was 41 seconds; ampere seconds per start, 4,063; average of the maximum readings, 188 $\frac{1}{2}$  amperes. On another run by another man, where 17 stops were made, the average time per start was 25 $\frac{1}{2}$  seconds, ampere

\* The instrument referred to is the Cravath current recorder, described in the *Railroad Gazette* April 30 last.

seconds consumed in start 2,931, and the average of the maximum current values 184 amperes. The tests mentioned were all made with the attempt to keep maximums as low as possible and the maximums were all, of course, lower than in common practice. The best results were obtained by working the controller so as to give as smooth an acceleration curve as possible.

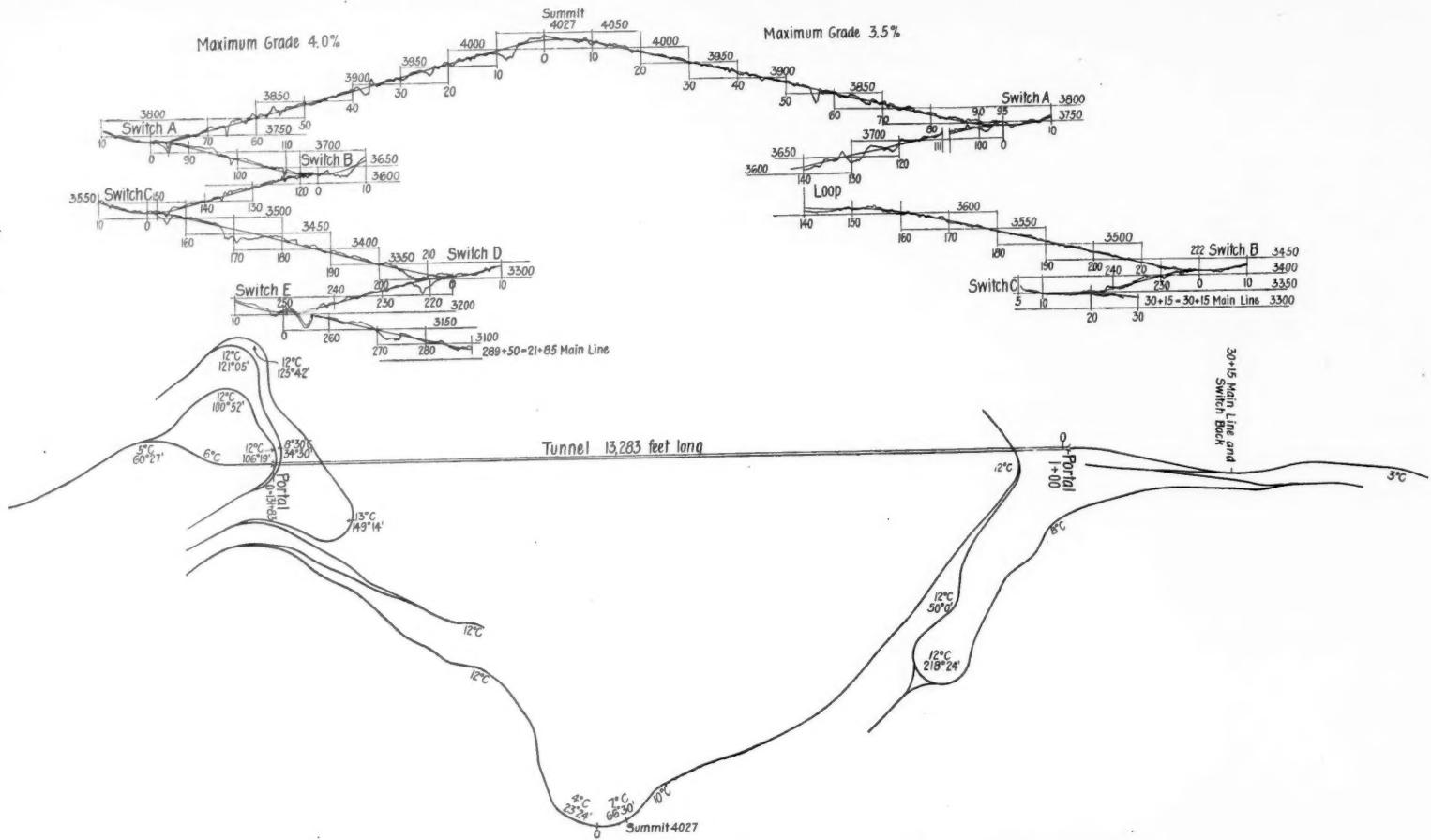
As to the general power consumption of one motorman as compared to another, Mr. Herman S. Hering

The line was built and opened for business in 1892, and the traffic has been handled ever since over a remarkable switchback.\* As will be seen from the illustrations, the tunnel is to be 2.51 miles long and straight its entire length. The grade falls from the east portal continuously through the tunnel at the rate of 1.7 per cent., or 90 ft. to the mile.

The switchback, from its junction with the main line on the east to the junction on the west, is almost exactly

the train and at the same time aid it in starting in the reverse direction. These tail-track grades are so nicely planned that the stop and start are made without jar, and passenger trains can cross over the summit at night without waking a passenger.

The total annual snowfall at this point is upward of 50 ft., so that keeping the tracks open in winter is a serious problem. After each snow storm the snow train, consisting of two engines and two rotary snow



Plan and Profile of the Cascade Switchback and Tunnel and Profile of the Switchback—Great Northern Railway.

carried on a number of tests at Baltimore some years ago which showed a difference of 20 per cent. in watt-hours consumed per car-mile in favor of an electrician who acted as motorman and above the average motorman making the same round trip. In view of this one wonders what would have been the difference could the test have been made on some unsuspecting below the average motorman.

Some tests made at Terre Haute by Mr. L. Gutmann, then of the Westinghouse Company, about five years ago, showed that a green man used 50 per cent. more energy than one of more experience and skill in making the trip on the same day with the same car. The difference in that case being due mainly to the waste of energy in the brakes.

A motorman, in starting a car, should pause after each notch, and until he feels that the motors have responded to the movement of the controller. This will prevent slipping of wheels, jerking of passengers and the use of excessive current. He should be especially careful not to throw from series to multiple until the motors have attained nearly their full series speed, and should not move on to a field-shunt point before the motors are speeded up on the previous one, or he will waste power and strain the armatures. The car should never be accelerated up to full speed when no time is to be gained by doing so. In running up behind teams, when it is sure that they will not immediately clear the track, he should shut off the current some distance back and let the car drift until nearly to the obstruction. It is a good general rule to shut off the current and drift with the brakes off as long before making a stop as is consistent with the schedule time, and then apply the brakes hard enough to make a moderately quick stop. In this way the high speed is maintained for a longer time than when the brakes are set very lightly, and consequently better schedule time can be made with less power. On down grades use the current as little as possible, as it will save work with the brakes and power also. All unnecessary stops should be avoided.

The author does not wish to pose as an advocate of snail-like operation of cars, but he does wish to point out the fact that the controller handling on the majority of large city roads is such as to cause a power consumption out of all proportion to the results that might be attained with no change in schedule.

#### The Cascade Switchback and Tunnel of the Great Northern.

As noted in a recent issue, the Great Northern Railway has commenced active operations on its proposed tunnel through the Cascade range, in Washington, about 114 miles east of Seattle. The map and profile of the tunnel and switchback published herewith will be found of peculiar interest at this time.

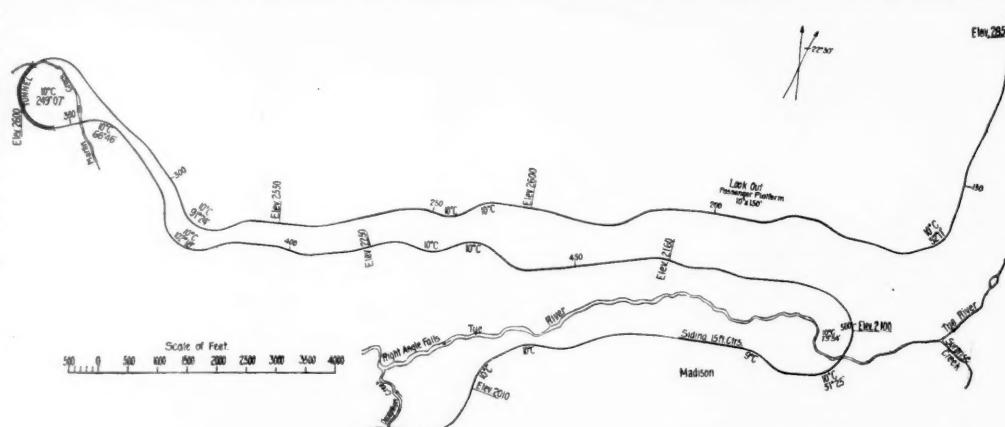
12 miles long, and the saving in distance by the tunnel will be about  $8\frac{1}{2}$  miles. On the easterly side of the mountain the grades of the switchback are  $3\frac{1}{2}$  per cent. (185 ft. per mile), compensated for curvature, and on the westerly side 4 per cent. (211 ft.), compensated. The curves generally do not exceed 12 deg., but there is one 13-deg. curve with 149 deg. of central angle. Following up the switchback from the east, it will be noted that there are three switches on the easterly slope and five on the westerly slope. A curve of 218 deg. central angle and 416 ft. radius will be noticed on the eastern slope, and this curve has a Y-track from its middle, which is not now in use. Trains in passing over the switchback are running backwards when they pass the summit, owing to this semicircular curve, but the long 13-deg. curve on the westerly side brings the trains head-first again.

The rise of the switchback from the east side is 677 ft. to the summit, and the fall thence to the west side is 898 ft. The mountain summit over the tunnel is 2,000 ft. above the east portal. On the westerly slope three

plows, makes a round trip over the mountain, seesawing over the switches, first one plow working and then the other, opening deep cuts through the drifts. A warm sun will settle the snow and narrow up the cuts, so that they will have to be plowed out again in order to have width enough to clear the cars.

This switchback has been operated successfully, and we believe without accident, handling all freight and passenger business since the opening of the road in 1892. Timbers 100 ft. long have been taken over these curves and grades without difficulty. Increasing freight business necessitates the improvement of the line by making the tunnel. It would have been poor financial management, of course, to construct the tunnel at the outset, before business was sufficiently developed to warrant such an expenditure.

The pass is peculiarly well adapted for a switchback crossing, and no doubt that point was well considered in selecting a crossing of the range. The grades on each side of the range are 2.2 per cent. (116 ft.), compensated



Western Approach to the Cascade Tunnel, Showing Development in the Valley of Martin Creek and the Half-Circle Tunnel.

switches parallel and adjacent to each other will be noted. Just beyond the ends of these switch tracks there is a great snow-slide, which is the reason for stopping the tracks as they are.

The process of handling trains over this switchback is very interesting. A heavy consolidation engine is attached to each end of the train, and a special train crew takes charge of the train. The tail ends of the switches are 1,000 ft. long, laid on a grade which serves to stop

for curvature. The fall on the west side is so rapid that even this rate of grade requires considerable development of the line. A few miles below the Cascade tunnel the line doubles up the valley of Martin Creek, a tributary of the Skagit, and reverses on a half-circle curve entirely in tunnel. During the time occupied in making this tunnel a temporary switchback was used up the valley of Martin Creek, and as this switchback reversed the trains, a switchback on the easterly slope, running off from the long curve before mentioned, was used to

\* See *Railroad Gazette*, 1893, pp. 2, 744.

turn the trains right-end foremost again. After the completion of the half-circle tunnel, which was a few months later, both these switches were abandoned.

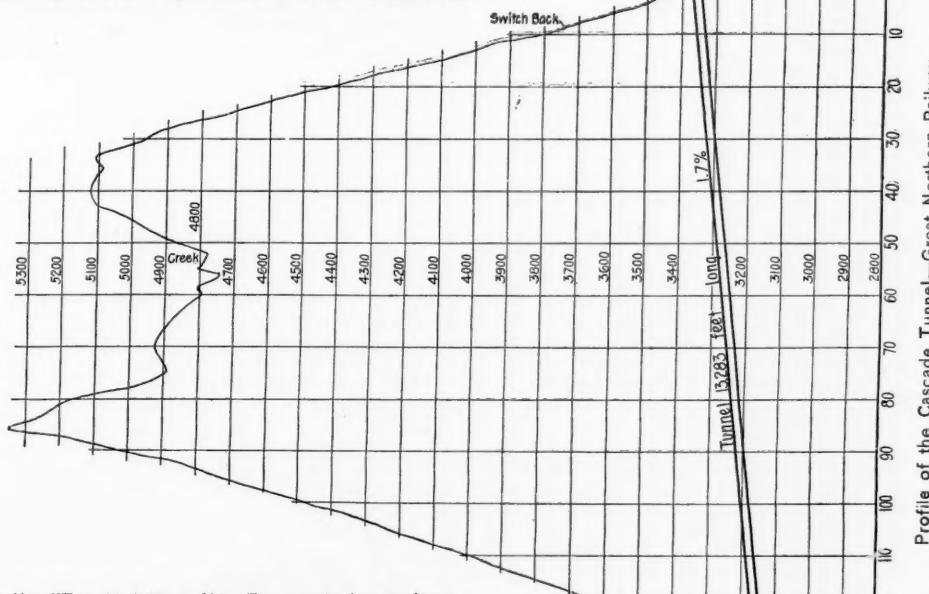
It is expected that the Cascade tunnel will be entirely in solid granite. At the west approach there is a good deal of loose and缝岩 which will require timbering. It is the intention to make the section large enough so that permanent masonry arching can be built inside the timbering without disturbing it.

The location and construction of the Great Northern Line west of Spokane was done under the direction of Mr. E. H. Beckler, Chief Engineer, by Mr. John F. Stevens, now Chief Engineer of the Great Northern. The work was accomplished in a remarkably short time.

#### The American Railway Association.

The fall meeting of the American Railway Association was held at the Holland House, New York City, on Oct. 6. There was a good attendance and the Executive Committee reported the membership as consisting of 243 companies, operating 156,688 miles of road. As instructed at the last meeting, the Executive Committee has appointed a committee to consider the metric system, consisting of W. F. Allen (Chairman), Theodore N. Ely (Pennsylvania), C. W. Buchholz (Erie), L. F. Loree (Penn. Co.) and E. C. Carter (Chicago & Northwestern). This committee has made a valuable preliminary report, giving a concise historical sketch of weights and measures. This report will probably be published in pamphlet form and the committee will continue its investigations, securing facts regarding present railroad practices throughout the world, and make another report at a future meeting.

On recommendation of the Executive Committee the Standing Committee on General Regulations for Employees was abolished. The "large-car problem" having been referred to the American Railway Association by the Joint Traffic Association, the Executive Committee offered a resolution, which was adopted, endorsing the majority report on large car construction made by a committee of the Joint Traffic Association last March. The contents of this report were given in the *Railroad*



*Gazette* of Dec. 11, 1896, p. 866. The resolution declares that any effort to control the dimensions of cars through the operating departments alone would be futile, and that the American Railway Association, therefore, regards it as vital that traffic officers should at once take the necessary steps to carry out the recommendations of that part of the [J. T. A.] report which relates to classifications and minima, viz.:

"Your committee finds no difficulty in reaching the conclusion that the remedy for the evils from which we now suffer by reason of the varied sizes and capacities of freight cars, and the tendency to increase dimensions and depart from uniformity, rather than adopt practices tending to uniformity, must be applied by the traffic officers through classifications and minima. And your committee earnestly urge that the respective associations take such action as will bring about a material modification of the existing practice, to the end that such minima may be established as will equitably adapt themselves to the different capacities of the cars now in service. We feel that better immediate results may be accomplished in this direction than in any other."

The date fixed for the fall change of time tables is Nov. 14. The place selected for the next meeting of the Association, April 6, 1898, is Louisville, Ky.

The Committee on Train Rules made a report giving the answers to certain queries concerning train rules. The substance of the answers is that—

(1) When an extra train receives the right of track over all trains, a first-class train must clear the extra the same as though it were a first-class train of superior right of track; that is, if running in the opposite direction clear it one second; if in the same direction, as per rules 385, 390 and 391 [which apparently means five minutes]; (2) where train No. 1 leaves A, a terminal station, at 1:10 p. m., and train No. 2 is due to arrive at A at 1:10, A is a meeting place and full face figures should be used in the schedule, but if train No. 1 leaves at 1:10 p. m. A is not a meeting place and full face figures are not to be used; (3) conductors and enginemen should not sign a train order until after the order has been repeated

and O. K. given; (4) where train No. 1 is ordered to wait at B until 5 p. m. for No. 2 and subsequently 1 and 2 are ordered to meet at C the second order does not cancel the first and the first remains in effect; the second order ought to specifically annul the first one, thus: "Order No. — is annulled. No. 1 and No. 2 will meet at C"; (5) if train third No. 23, starting from A, is annulled at C it is not right to run another third 23 from D to E. This decision is made on the assumption that the stations named are all in the same dispatching division.

The committee states that the work of revising the standard code is making substantial progress. "The code now in force has for the most part given very satisfactory working results, and while there is consider-

The Committee on Car Service made a report recommending that the rules governing the loading of lumber and timber on open cars, etc., as revised by the Master Car Builders' Association last June, be made the rules of this Association, but after being discussed at considerable length, the recommendation was finally laid over for consideration at the Spring meeting. This committee also reported, with its endorsement, the action of the Demurrage Managers (at Boston last June) declaring that agents ought to be held accountable for all "car-service" (demurrage) *earned* by cars and not merely for all money *collected*.

The car service committee reported on two other subjects, Car Ferries and Excess Loading. In the matter of car ferries, which came up in consequence of differences of opinion as to mileage allowances for cars carried on boats, the committee makes no recommendation, having only lately gathered the facts, but a list is given showing statistics of railroad car ferries all over the United States.

The committee gives replies from 193 roads concerning their practice in allowing cars to be loaded beyond their marked capacity, the Association rule allowing not over 10 per cent. A large majority of the roads replying conform to the Association rule. A number of roads make conditional replies, of which we quote two:

From J. T. Harahan (Ill. Cent.) This whole question seems to be very much misunderstood by railroad officials as well as by shippers. Since the Association rule went into effect, allowing a maximum excess loading of 10 per cent. of the capacity of car, it has been taken by nearly everyone to mean that the regular loading of these cars can, at any and all times, go 10 per cent. beyond their marked capacity, and the consequence is that all cars are more or less overloaded. It seems to me that the Association should revise its rule so that its purpose may be clearly understood, which purpose I understand to be about as follows: "That cars ordinarily shall be loaded to no more than their marked capacity, but in cases where, in the absence of scales, the exact weight cannot be determined at the time of loading, an excess in weight of 10 per cent. of the marked capacity will not prevent cars from being delivered by one road to another in the interchange of traffic."

From C. H. Platt (N. Y., N. H. & H.) Mark cars actual capacity and restrict load to that amount. Under the original rule of the Association, we marked our cars 4,000 lbs. less than the maximum capacity, so as to allow for the 4,000 lbs. excess, in accordance with the rule, and no change has been made since that time.

Most of the roads which do not follow the 10 per cent. rule have arbitrary allowances varying but little from 10 per cent. In view of the large majority in favor of the 10 per cent. rule the committee does not recommend any change. The whole of this committee's report, except that concerning loading long lumber, was adopted.

The Committee on Standard Wheel and Track Gages made a report concerning the practice of various roads in the matter of widening gage of track on curves. This was given in the *Railroad Gazette* last week.

The Joint Committee on Interlocking and Block Signals submitted a code of definitions, requisites of installation and rules for operation of interlocking signals, which was adopted without change. This code will be found in another column. It will be included in the next official issue of the Standard Code.

The elections to membership on committees resulted as follows: On car service, Wabash; Louisville & Nashville; New England; on safety appliances, Cleveland, Cincinnati, Chicago & St. Louis; Chicago & Northwestern; Philadelphia & Reading.

#### Wood Screws and Spikes for Railroad Track Use.

BY. A. MORRISON, C. E.

*Rail Movements.*—Preliminary to treating on the relative merits of wood screws and spikes in holding the rail and crosstie together, let us first consider the movements of the several parts comprising the track that affect the spike or screw in the performance of the several functions required of them.

Close observation of a passing train reveals the fact that there are four supports which undergo depression, the rail, the tie, the ballast and the roadbed, each acting in the order named as the load is applied; the movement of the rail is much the greatest, and next is that of the tie. The depression of the ballast and roadbed is felt rather than seen, the tremor in some cases extending for a considerable distance from the track.

Tests made under the supervision of the authorities in charge of the United States arsenal testing plant at Watertown show the mean depression on a 100-lb. rail (laid on oak ties and ballasted with broken stone), under the driving wheel of an engine exerting a load of 22,000 lbs., to be five thirty-seconds of an inch. This report states that there was an upward flexure of the rail for a distance of from 12 to 15 ft. in front of the first wheel of the locomotive, which was followed by a depression having an inclination toward the locomotive; also an upward flexure between the wheels. As the several wheels successively passed over the place of observation the maximum depression was reached, the depression varying according to the weight on each wheel; after passage of the locomotive the depressions became gradually obliterated, and eventually the rail practically resumed its original level. These tests show the various vertical movements of the rail, and further prove the necessity of such a fastening for the rail and tie as will allow no obstruction to the wave movement of the rail sufficient to lift the tie from its bed in the ballast.

able room for improvement in the way of rearrangement, condensation and simplification of language" the committee will take great care and go slowly in its work of revision. The committee has asked the Train Dispatchers' Association to present suggestions affecting train order rules. That portion of the code will be reviewed during the next six months.

This report after considerable discussion was approved.

otherwise were the rail and tie held so firmly together that the tie would work up and down in the ballast with every vertical movement of the rail; this would disturb and destroy the ballast and result in what is commonly known as "mud pumping ties."

There are two other movements of the rail which exert a material influence on the rail and tie fastening; they are the creeping or longitudinal, and the lateral movements of the rail. The former is principally destructive when acting in conjunction with the vertical and lateral movements, which cut into the ties by exerting a grinding motion on the surface fiber of the tie, and is greatly facilitated by the sand becoming deposited between the surface of the tie and base of rail. This same compound movement of the rail is also destructive in cutting the necks of spikes along the outer base of rail. The lateral pressure exerted on the rail and tie fastening is greater along the outer base of low rail, due to the angle of super-elevation changing the vertical line of pressure toward the outer base. On the high rail, and on tangents the vertical load and flange contact give a resultant stress toward outer base of rail, and when a train rounds a curve slowly so as to give flange contact to the inner rail, the pressure is further increased toward the

with tongs until they were fully started; when driven within 1 in. of being home they were set by a wrench. This device was expected to facilitate renewing rails of similar base, but when this work was attempted it was impossible to turn the screw the quarter turn to release the base of rail, as it had rusted fast to the fiber of the tie. For the same reason wood screws have been abandoned wherever there was a likelihood of their being extracted previous to the decay of the wood.

Third.—That the spike is more easily and economically applied and extracted than the wood screw.

#### Recent Improvements on the Baltimore & Ohio.

##### TERMINAL IMPROVEMENTS AT BALTIMORE.

In March, 1896, the Baltimore & Ohio Railroad went into the hands of Receivers. Since then much important work has been undertaken by the Receivers, John K. Cowen and Oscar G. Murray, consisting of extensive improvements and repairs in roadway, equipment and terminal facilities. The Receivers found the physical condition of the road very bad, necessary repairs in all departments having been to a large extent neglected, and no new work of importance undertaken, with the exception of the Belt Line tunnel, under the city of Baltimore. The Receivers, finding themselves unable to handle even the limited amount of business that the road was then getting, decided that their proper policy would be to undertake a broad and comprehensive plan of improvement, which is now being carried out. The extent of this building up may be readily seen by a consideration of expenditures from March, 1896, to the present time. During the 11 months from March 1, 1896, to February 1, 1897, there was expended in purchasing new equipment, making extraordinary repairs, improvements in terminals, roadway, etc., about \$8,000,000. Of this amount, \$5,000,000 was spent by the motive power department alone, and \$1,000,000 went for new rails. Since February, 1897, additional large sums have been expended, the total amount to date being about \$12,000,000.

The expenditures by the motive power department have embraced the cost of 140 new locomotives and 9,000 new freight cars. The roadway work has included the gradual substitution of 85-lb. rails for 67-lb. rails in main track, the elimination of heavy grades and sharp curves and the construction of a number of important bridges.

The terminal improvements, some of which are not yet completed, are extensive and very necessary. They include the new Mt. Royal station in Baltimore and the improvements in and additions to Camden station, in that city, together with the construction of a large train shed; the construction of a new tobacco warehouse at Canton and the rearrangement and enlargement of the Locust Point yards in Baltimore, the construction of new yards at Pittsburgh and at Glenwood, near that city, as well as the building of the Glenwood cut-off, the reconstruction of the shops and the building of a new yard at Cumberland and some smaller work at Brunswick, Harpers Ferry and elsewhere. Plans have also been made for the construction of new passenger and freight stations and new shops at Connellsville, Pa., the present structures at that point being 40 years old.

The fine new station on Mount Royal avenue, Baltimore, was fully described in the *Railroad Gazette* for May 15, 1896. It was begun under the old management, about six months before the beginning of the Receivership, and was finished and opened to traffic in the summer of 1896. It is a handsome granite building. The train shed is 400 ft. × 75 ft., spanning the open cut at the north portal of the tunnel. This station is a stopping point for all through trains between New York and Washington, a second stop being made at Camden station at the south end of the tunnel. At this latter

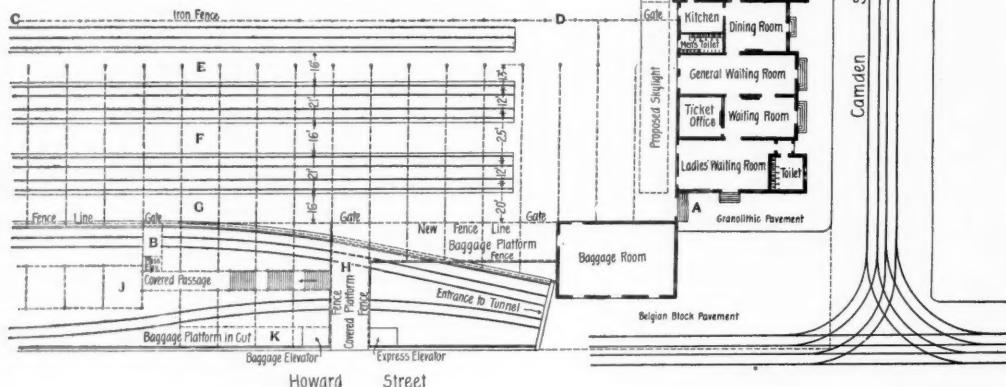


Fig. 1.—Plan of Camden Station, Baltimore, as Enlarged this Year.

outer base; so that the rail is soon tilted outward by the ties cutting in conforming thereto, hence the necessity for such a fastening for rail and tie as will give the greatest lateral resistance, as well as for a tie plate to prevent the cutting of the ties and spikes as above described.

**Track Spikes.**—The track spike, while by no means perfect in performing the work required of it, does, however, fulfill the requirements better than any other device yet invented and tried; no better proof of this is needed than the fact that the spike was the earliest form of rail and tie fastening used in this country, and with very slight modifications is still the standard on all of our railroads. Inventors sought to secure, by the use of other devices, a greater degree of adhesion and lateral resistance, but without success. When a device was tried that gave greater adhesion than that secured by the spike in an oak tie the result was that the tie was lifted from its bed in conforming to the wave movement of the rail, which displaced the ballast, and in certain kinds reduced it to powder and "pumped mud." This latter defect is a sure indication of a tie working in the ballast. A spike when driven in a new oak tie has for a time sufficient adhesion to lift the tie from its bed, but in other kinds of wood ordinarily used for ties it is partially pulled from the tie, to the extent that the vertical movement of the rail ceases to lift the tie from its bed, thus leaving the tie and ballast acting in unison in receiving and distributing the applied weights on the roadbed. Some attempts were made to improve the lateral resistance of the spike by making it thin and wide, so as to abut a greater area of end fiber of the tie. These spikes, however, proved a failure by bending in driving, or afterward by rail pressure. The facility with which track can be laid and repairs executed is possible with no other fastening than that of the ordinary track spike. This makes the spike a special favorite with maintenance of way officers and the trackmen by simplifying their work.

**Wood Screw.**—Next to the spike the wood screw as a rail fastening has been more successful than any other fastening experimented with.

The first objection to the wood screw is the additional cost of its application and use. In laying new track the delay occasioned by its use would be such that the work would be seriously retarded. When relaying rail or re-gaging track it would not be done by plugging the holes and resetting the screws, as done with the spikes, but would require to be placed in solid timber to give good results, thus damaging the ties and destroying the stagger of the fastening, as originally given for the purpose of bracing the tie in relation to the rail. Experience with wood screws, particularly in oak, either as fastenings for rail or in securing switch stand to headblocks has demonstrated that after a certain time the thread of the screw unites with the fiber by rust and cannot be extracted by a direct pull without stripping the fiber that forms the threads, and when it is tried to extract it by turning it out, the head is simply twisted off from the screw. A number of years ago the writer used screw spikes as a rail fastening, made with a thread sloping upward, so that they could be driven similar to a spike. These screw spikes were difficult to drive, owing to a blunt point, and required an extra man to hold them

where wood screws of the usual make have been used as a rail fastening, the wave movement of the rail in time breaks a number of their heads off, the almost constant lifting of the tie by the head of the screw exerting a strain too great for the latter to resist. This device, holding the rail and tie firmly together, does diminish the cutting of the tie by the rail seat, but this is more than counteracted by the defect that the vertical rise of the rail is transferred to between the under side of tie and ballast, creating the defective conditions herefore described, which conditions require the expenditure of more labor to correct than any other destructive movements. The wood screw, defective in the capacity just cited, is still more so in preventing the track from spreading. The round surface of the screw presents an obtuse wedge against the end fiber of the tie, which fiber, instead of resisting the pressure in a body, splits, and thus allows the track to spread with a minimum resistance.

**Tests by Pittsburgh Testing Laboratory.**—An examination of a report of tests made by the Pittsburgh Testing Laboratory proves the points presented in the foregoing.

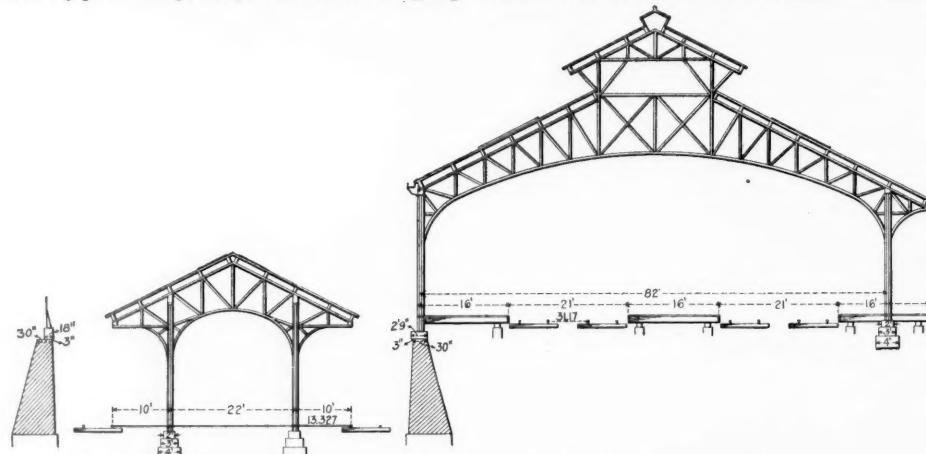


Fig. 2.—Cross-Section of Train Sheds, Camden Station, Baltimore, Md.

The substance of the report of tests is as follows: Two wood screws 6 in. ×  $\frac{3}{4}$  in., holding a section of rail on a white cedar tie had but 58 per cent. of the lateral resistance to spreading of track, as a similar section of rail held by two Goldie spikes. By a similar test in a pine tie the wood screws had 67 per cent. and in oak 96 per cent. the resistance of that of the Goldie spikes, the sectional area of screws being .4465 in. and that of the spikes but .3677 in. The test of adhesion shows that a wood screw in white cedar had 1 $\frac{1}{2}$  times, in pine 1 $\frac{1}{2}$  times, and in oak 1 $\frac{1}{2}$  times greater adhesion than the Goldie spike.

The deductions of the foregoing may be briefly stated as follows:

**First.**—That the track spike is better adapted to the wave motion of the rail, and consequently gives better protection to the road ballast than the wood screw.

**Second.**—That the spike offers greater resistance to the lateral thrust of the rail.

point, the practice heretofore has been to run out clear of the tunnel and then back up into Camden station to receive and deliver passengers. This made a delay of several minutes, to avoid which the extensive improvements at Camden station have been made.

These improvements consist of a brick addition to the station proper and two train sheds, one, 350 ft. × 42 ft., over the tracks in the open cut at the tunnel entrance, and one, 630 ft. × 82 ft., parallel to this, but on the level of the main station building. The work also includes the arrangement of the old train shed for freight use and the construction of interlocking switches and signals in the station yard.

The accompanying engravings show the changes in detail. Two rooms have been added to the old station at its eastern end, one to be used as a ladies' waiting room, 50 ft. × 26 ft., the other, a general baggage room, 64 ft. × 40 ft. The old general waiting room is now the

excursion room. To form the new waiting room the wide hallway formerly used as an exit, and the old office of the ticket supply clerk, have been united by cutting two large arches in the intervening wall, thereby forming a large and handsome room. The ticket office is located in the southeast corner of the general waiting room. The old ladies' waiting room is now the dining room. The kitchen was formerly in the basement. The new exit for passengers will be at A, between the ladies' waiting room and the baggage room. This, it will be seen, allows passengers to pass directly from the train platforms to the street without entering the main part of the station. A 20-ft. granolithic pavement leads from this exit along the east end of the station to Camden street.

The station in its remodeled form will consist of three distinct parts, one devoted to through traffic, one to local traffic, and one to freight, each having its own train shed and platforms for arriving and departing trains.

The through service will all be handled upon the low level tracks in the open cut. The platform between these tracks is reached from the street level by a 10-ft. covered stairway leading from a 20-ft. covered platform spanning the cut, as well as by a passenger elevator, at B, depositing passengers between the tracks. The train platform in the cut, 350 ft. long and 42 ft. wide, is covered by a slate-roofed shed, supported by steel columns 22 ft. apart, carrying single latticed arches. There is also a second platform in the cut, to the east of the tracks, which is provided with baggage and express elevators leading to the 20-ft. covered platform spanning the cut. From here a special baggage platform 20 ft. wide leads directly to the baggage room. This separa-

architects, of Baltimore, is 216 ft. x 284 ft., six stories high, and has about 363,000 sq. ft. of floor space. Three of the four warehouses—the building is divided into four distinct parts—will be used exclusively for the reception, inspection and storage of tobacco, while the fourth will be used as a general freight station. Above the first floor there is no connection between the four warehouses, and the connections on the first floor may be closed by heavy iron doors. The structure is of brick, laid in cement mortar, the foundations being laid on piles with concrete capping. The division walls are 30 in. thick and rise 2 ft. 6 in. above the roof, which is largely in excess of the amount required by the city. The framework of the building is of steel and the interior flooring and timbering is of Georgia pine. Each warehouse is provided with a separate elevator.

The tobacco warehouses have a capacity of about 18,000 hogsheads, and can carry 20,000. There are six screws in the inspection department, giving a capacity of about 235 hogsheads per day.

The location of the building is especially worthy of notice. It is surrounded on two sides and a part of a third by deep water, two covered piers, one 184 ft. long, the other 231 ft., affording ample room for transferring freight to and from vessels.

Across the harbor from the warehouses just described are the Locust Point freight yards and piers, the main tide-water terminus of the Baltimore & Ohio. Here about \$70,000 has been spent in increasing the capacity of the tracks and otherwise improving the yard. A large lot of vacant land, shown in the engraving, between Fort Avenue and the water front, has been graded and tracked, giving a storage capacity to the yard of 3,600 cars. There is about 10 miles of track, most of

lows: Thirty-three lbs. of coal were used per car per day, costing, on an average, \$4.55 per ton of 2,000 lbs. This coal costs 7½ cents a day. The average cost of repairs on account of stoves was given as ½ cent a day. The average cost of dumping fires, and removing coal and ashes before the car is run into the barn, and coaling up and kindling fire in the morning, including the cost of kindling used, and that part of cleaning cars chargeable to stoves, averaged 10 cents a day. The average cost per car of other expenses chargeable to stoves, not included in the above, as removing the stoves for the summer, installing the stoves in the fall, repairing the head linings, repainting, etc., averaged 1¼ cents a day.

I find that the total of the items thus far aggregate 19½ cents a car per day. This does not include the space occupied by the stove, which is equivalent to seats for one or two persons, and which one-third of the railroads considered should be charged to the stove. No basis for determining the amount of this charge on account of the seating capacity of the car being decreased by the stove was given in the answers. The amount would appear to vary with different roads, depending somewhat upon the crowded condition of the cars on any particular road, and this question can be best determined by each road for itself. In my judgment, from 20 to 30 cents a day, and in case of roads whose cars are generally crowded a much larger amount should be charged to the stove on account of the paying space it occupies. Assuming this amount to be 25 cents a day, the total cost of operating the stove would be brought up to 44½ cents a car per day, the only uncertain item being the item for the space which the heater occupies.

It is conceded that the cost of heating the cars by electricity should be based upon the extra cost incurred

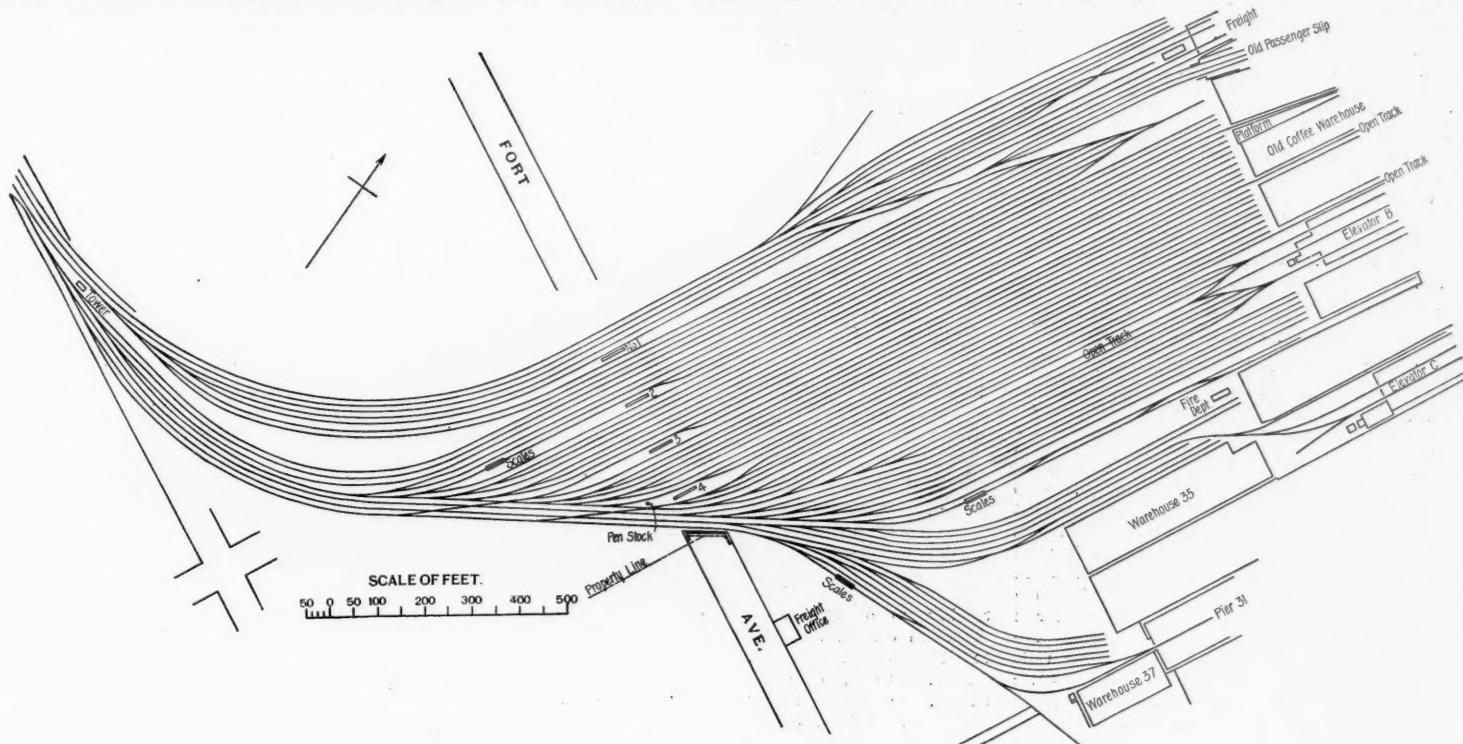


Fig. 3.—Locust Point Freight Yard of the Baltimore & Ohio Railroad, Baltimore, Md.

NOTE.—The tracks leading to the old passenger slip and those north thereof formerly made up the yard at this point, the new work being south of these tracks.

tion of the passages for baggage and for passengers is an excellent feature.

The large train shed on the level of the old station and tracks is 630 ft. long and 82 ft. wide center to center of columns. Its extreme width is 90 ft. The four tracks in this shed will be used for local trains, those whose trips begin or end at Camden station. The tracks in the old train shed west of this will be used for freight, and the rooms at the west end of the old station will be fitted up as freight offices.

In Fig. 1 platforms E, F, G and H are on the upper level and J and K are on the lower level. The difference in levels is indicated by the cross-section, Fig. 2. This section is taken at the south end of the train shed, which is not shown in the plan. It will be seen that the upper tracks (elevation 31.17) are about 18 ft. higher than the lower tracks (elevation 13.327). At the north end, the part shown in the plan, the difference in levels is three or four feet greater than at the south end.

The old Camden station building is of brick, having a central tower and two wings each having a tower. It was built in 1857. The newly added part is also of brick, one-story in height. The entire structure is now painted gray and makes an imposing appearance.

The steel work for the new structures was supplied and erected by the Edge Moore Bridge Works, from designs by Mr. J. E. Genier, Bridge Engineer of the road. The entire cost of the work will be about \$100,000. It is substantially completed, and was opened for business Oct. 10.

Besides improving its passenger terminals in Baltimore, extensive improvements in the freight-handling facilities have been made. A very large tobacco warehouse has been completed at Henderson's Wharf, Canton, for the storage and handling of tobacco. This structure, built from plans by Messrs. Baldwin & Pennington,

which will be laid with 67-lb. rails on chestnut tie 7 in. x 7 in. x 8½ in.

A new dock for foreign vessels has been built. Warehouse No. 35 has been moved 120 ft. to the west, taking the position shown on the engraving. It formerly adjoined pier 31. The intervening space thus formed is now being dredged out to form a slip for the new dock.

To carry Fort avenue over the tracks added to the yard, four heavy spans of latticed girder bridging have been built at the expense of the railroad company.

[TO BE CONTINUED.]

#### Progress in Some Details of Electric Railroads.

The following extracts from letters, written by leading concerns dealing in street railroad supplies, will give some idea of the work done in a few different departments the past year, the modifications in the types of the apparatus used and the trend of present improvements.

In the early stages of electric railroading, the machinery and apparatus employed in the generation, transmission and utilization of electricity were subject to radical changes from year to year, but the entire system has so far been perfected that the improvements are mostly in the line of modification of many of the details of construction. Some of the improvements are noted in the following communications. Other replies to our letter of inquiry came too late for publication in this issue.

#### ELECTRIC CAR HEATING.

*Consolidated Car Heating Co.,*

ALBANY, N. Y., Oct. 5.

Some time ago we addressed a series of questions to street railroad companies, and from the answers received I obtained averages, which may be summarized as fol-

in generating the additional amount of current necessary to operate the electric heaters. It is not proper to charge to electric heaters wage and interest accounts, etc., which would be just the same were the electric heaters not used. The cost, then, of heating by electricity is represented by its effect upon the coal pile. This has been determined by quite a number of roads, and among them I will refer to the South Chicago City Railway, a report of the test of which was discussed editorially in the *Railroad Gazette* Feb. 5, 1897. As stated by the Superintendent, Mr. B. J. Jones, of that road, the third position of our five-point regulating switch was the average position used in winter weather, and the cost of running the heaters 18 hours a day on this basis of extra fuel required each day amounted to 16.3 cents. This would practically represent the additional cost incurred on account of heating their cars by means of electric heaters, as the wage accounts remain the same whether electric heaters are used or not. Should, however, the wage and interest accounts, with oil and waste, etc., be included, it would be but 44.2 cents a day.

It will be understood that no allowance is made for burn-outs of electric heaters, on the ground that this company has over 50,000 of its heater coils in use without ever having had a single case of burn-out in any of its heaters; no cost has been incurred on account of this item, which, however, is an item of some importance with certain makes of electric heaters. In case an accident should occur, the coils of our heaters can be renewed at a cost of 25 cents each.

The body of the cars on the South Chicago Railroad I think, are 20 or 22 ft. in length. The amount of current necessary to heat cars such as are used on the elevated roads is about one and a half times that required to heat a 22-ft. car. While the elevated cars are very much larger, they are very much better built, their walls

are better insulated, and consequently less heat is required to keep them comfortable in cold weather.

JAMES F. McELROY. Consulting Engineer.

DIRECT-CONNECTED UNITS IN POWER STATIONS.  
*Buckeye Engine Co., }  
SALEM, O., Oct. 8.*

We were early advocates of direct-connecting engines to railroad generators. The first engine thus connected was a non-condensing compound of about 750 H. P. direct connected to a Siemens & Halske generator of 500 kw. capacity. This plant was installed at the Brighton station of the Cincinnati Street Railway Co. The next station equipped with direct-connected machines was the City Railway Co. at Dayton, O., in which were installed three of our 500 H. P. compound condensing engines, directly connected to a 350 KW. generator. This was in the spring of 1894. Since then the majority of engines turned out by us for electric railroad service have been of the direct connected type.

It is our experience that direct connected plants are safer, more economical and while they may be more expensive in the installation, are much cheaper in the long run than belted plants.

New work in railroad lines has not been very extensive the past year, and we have equipped but few plants, some of which are the following: New Castle, Pa., Electric Co., two 400 H. P. cross-compounds, direct connected; Calumet Electric Railway, Chicago, one 800 to 1,000 H. P., direct connected; Marion City Railway Co., Marion, Ind., two 500 H. P. tandem compounds, direct connected; Lima, O., Electric Co., 450 H. P. simple, belted; Public Works Co., Bangor, Me., 600 H. P. cross-compound; Marietta, O., Electric Railway Co., 100 and 150 H. P. simple engines, belted; Hartford, Manchester & Rockville Tramway Co., Manchester, Conn., 500 H. P. compound, direct-connected; Concord Land & Water Power Co., Concord, N. H., 400 H. P. direct-connected; Exeter & Hampton Street Railway, 100 H. P., simple, belted; Alton Street Railway Co., Alton, Ill., 300 H. P. simple, belted; Georgetown Street Railway Co., Georgetown, Ky., 150 H. P. simple, belted.

The most of these belted units went into stations that had been equipped formerly with belted engines and generators, or where they were used as auxiliaries to a water power plant. The work for coming year is very promising in all lines. We have booked orders for nearly 3,000 H. P. of engines for manufacturing purposes in the past three days.

BUCKEYE ENGINE CO.

TRACK BONDING FOR ELECTRIC ROADS.

*The Edison-Brown Plastic Bond, }  
NEW YORK, Oct. 9.*

Since it is now admitted that defective rail bonds may cause a loss of 40 to 60 per cent. of the electric current generated, engineers are giving much thought and attention to this subject, and the day of the short, cheap copper bond is nearly over. Of course there are still many contractors in business who seem to think that a bond costing 15 or 20 cents is good enough, and they fail to realize that false economy here will cost them ten times the amount in trolley-feeder wire to maintain a given pressure and load. Each modern 90-lb. steel rail has a conductivity equal to 1½ sq. in. of copper, and the ideal electrical conditions would be met if the rails could be made continuous lines of metal. The electric welding process was supposed to give this result, but the presence of the necessary flux between the welded surfaces seriously cut down the conductivity.

The electric current also carbonizes and softens the metal to which the high heat has been applied, thus producing in a short time two low spots on tread of the rail at every joint. Great conductivity has been claimed for what is called the "cast-weld" joint.

This is made by pouring melted iron into a metal mould clamped around the cold rail ends, which is supposed to form a weld of low resistance. Though this makes an excellent mechanical joint, it is an exceedingly poor conductor even at the start, and it grows poorer as time passes. The writer has measured the conductivity of hundreds of these joints both when new and after one and two years' use, and even in dry soil they proved worse than the average copper bond. This was unexpectedly verified by the tests made in September last by Mr. E. B. Ellicott, Superintendent of City Telegraph, Chicago, who found the gas and water pipes very seriously injured by electrolysis near the tracks of the Chicago City Railway. Here, although double tracks of 90-lb. rails led in several different directions, and were connected by the "cast-weld" joint, each joint was bonded by two large copper bonds of one of the best types. Yet the electrical conductivity was so poor after about a year's service that the pipes were overloaded and ruined.

Had these rails been so bonded as to give each joint the full conductivity of the rail, 24,000 to 30,000 amperes could be returned on the rails without injuring the pipes. Some engineers have electrically welded copper bonds to the rail web, but found that the current had robbed the steel of its strength at surfaces of contact with the copper, and had decidedly increased the resistance of the copper.

The result was that many rails split in a line with the bolt holes and their heads bent upward. Another person is advocating a copper bond soldered to the web of rail, unmindful of the sad fact that in any moist soil solder is completely oxidized in a short time by electrolysis. Most of the early electric roads soldered their bond wires to a "supplementary wire" between the

tracks, and great was the astonishment of the experts when the solder was found to have disappeared, and in some cases the tin plated copper wire had also gone.

There are hundreds of types of copper bonds, ranging from old pieces of trolley wire, roughly riveted into holes in rails or fastened with channel pins, up to flexible copper bands or cables with more or less elaborate contact devices. But there are three forces always at work to destroy the efficiency of a copper bond: first, heat, since the different ratios of expansion of steel and copper will spoil the contact surfaces; second, the pounding of the car wheels at a joint, which makes the copper brittle, and third, chemical action of the moisture in the earth on the two metals. This tends to dissolve the copper and to coat the steel heavily with iron oxide. So powerful is this action in certain soils that even tin plated copper wires one half inch in diameter buried between the rails have been so damaged within three years that only slight traces of them could be found.

Marine engineers have reason to appreciate the penetration of iron oxide on ship or boiler plates, since it will force its way beneath the heads of steel rivets, set by hydraulic pressure. And as this oxide is almost an insulator, it is easy to appreciate the temporary character of an electrical contact between the surfaces of a soft copper rivet and of a hole in a steel rail. Many of our American electric railroads are built by contractors who have no interest in the economical operation of the road nor in the damage that their poor or cheap work may inflict on city water pipes. Their sole business is to do the construction work as cheaply and as quickly as possible and to get their money.

This class has created a demand during the past two years for a 15-cent copper bond, when safety of pipes and economy of operation require eight or ten times that amount of copper or its equivalent.

So some of our municipal authorities are thus idly permitting a practice which in time will produce leaky gas and water pipes as at Spokane, Washington, in September; and may even cause gas explosions similar to the one in Boston a few months ago. At the very best the results of this work will mean an eventual

on edges of plate. During the past three years many thousands of these bonds have been sent to all parts of the world and the unique efficiency of this method of making electrical contact is proved by the use of these alloys in many large power-houses between the accurately ground and polished surfaces of copper bus bars, switches, etc., where contact losses have hitherto been overlooked. No engineer would now use line wire with unsoldered joints however perfect the mechanical clamp might be. In the near future he will require equal perfection in the rail return circuit, which can easily and cheaply be attained by means of this plastic material.

HAROLD. P. BROWN.

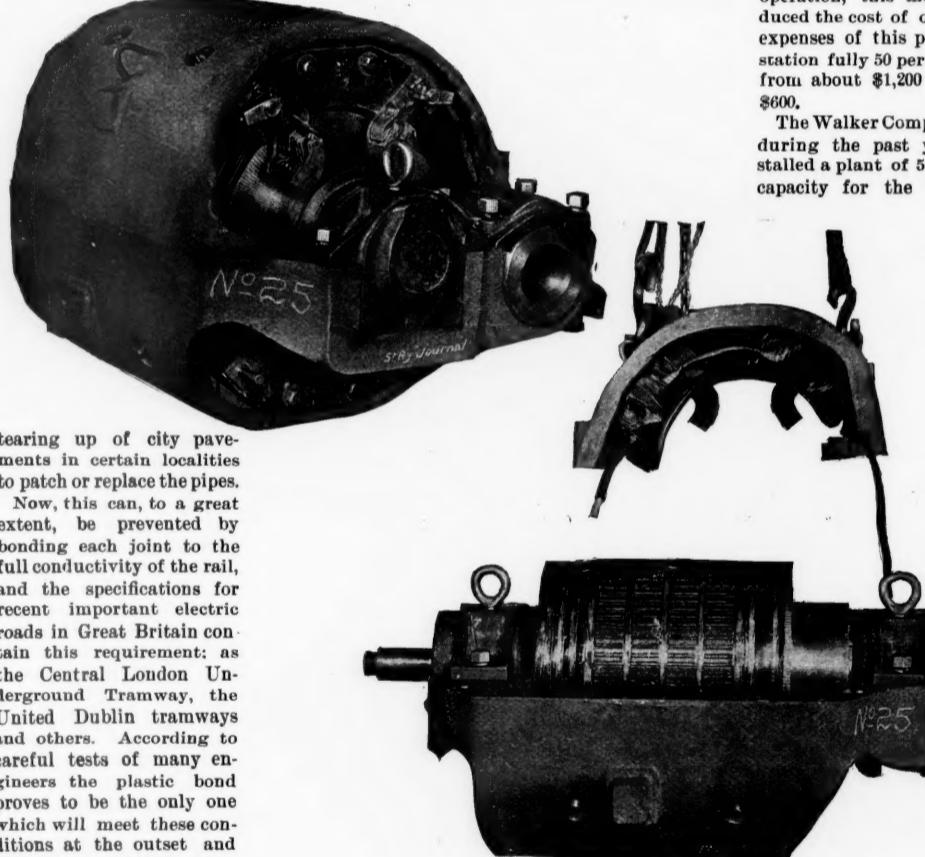
LARGE GENERATORS AND OTHER APPARATUS.

*Walker Company, }  
CLEVELAND, O., Oct. 9.*

During the past year we have exported our street railroad motors and generators in large quantities to Russia, Germany, France, Italy, Austria-Hungary and other European countries. We shipped the entire electrical equipment for an electric road in Alexandria, Egypt, also the complete electrical equipment for an electric road in Japan. This latter country has made considerable progress in equipping roads with electricity, and the coming year will doubtless see larger developments in this line than the past.

In this country, we have installed the largest street railroad generator ever built. This generator is of 1,500-KW. capacity, runs at 80 revolutions per minute, and is direct connected to an Edw. P. Allis Co. 30 and 60 × 48-in. tandem engine. This machine is now in successful operation in the power station of the Metropolitan Street Railway Co., Kansas City, Mo. The service which this machine is called upon to perform is somewhat novel; in addition to furnishing electric current for a large number of electric cars, it is called upon to furnish current for driving 26,000 ft. of cable for the cable roads of that company. This is done by making a motor of an old 300-KW. generator, which was formerly used for driving electric cars, which is connected by belt to the cable-driving machinery. This motor has replaced a 250-KW. engine. During the first month of operation, this method reduced the cost of operating expenses of this particular station fully 50 per cent., or from about \$1,200 to about \$600.

The Walker Company has, during the past year, installed a plant of 5,000-KW. capacity for the Chicago



Short's Electric Motor for Elevated Railroads—Made by the Walker Co.

tearing up of city pavements in certain localities to patch or replace the pipes.

Now, this can, to a great extent, be prevented by bonding each joint to the full conductivity of the rail, and the specifications for recent important electric roads in Great Britain contain this requirement; as the Central London Underground Tramway, the United Dublin tramways and others. According to careful tests of many engineers the plastic bond proves to be the only one which will meet these conditions at the outset and which will maintain them for years of service.

The same testimony comes from the engineers of the Australian government where this bond has been used on three different railway systems, and from leading railway engineers in this country.

This bond, as is well known, was invented by Mr. Edison and was put into its present form by the writer. It is composed of a soft, plastic metal compound having a mercurial base, but with an electrical conductivity equal to that of copper. Contact spots on the adjoining surfaces of rail web and angle plate are cleared of rust and scale and are amalgamated by Mr. Edison's process.

The plastic alloy is then used to complete the circuit between rails and plates. It is held in position by an elastic receptacle composed of cork and oxidized linseed oil. The plastic alloy adheres so strongly to the amalgamated surfaces that water cannot get in and the union caused by this adherence is so complete that the contact resistance is entirely eliminated. As these metals cannot be oxidized by water, acid, nor alkalies that are present on street surfaces, and as no amount of motion nor hammering of wheels can injure them the electrical conductivity is permanently maintained. Heavy steel spring lock washers are used to keep the track nuts from loosening and to take up any slack caused by wear

City Railway, using in this plant six units of the same size. This plant is somewhat of a departure from the usual custom, in that the 880-KW. generators are driven by ropes in pairs, instead of being direct connected to the engine shaft. These machines run at 220 revolutions per minute, and are undoubtedly the largest rope-driven machines in existence.

The tendency for connecting the generator direct to the engine shaft seems to be growing rapidly, and for large units is undoubtedly the most economical and most practical method for driving large generators. This is due to the fact that generators of this type demand less attention, owing to the lower speed, and the repairs are less costly. The coming year will doubtless see but few belt-driven plants installed.

Probably the greatest innovation in the electric motor business during the past year has been the introduction of Professor Short's No. 25 motor for elevated railroad service, shown by the accompanying illustrations. This motor has an easy pulling capacity of 200 H. P., and a pair of these motors can easily draw a train of cars on an elevated railroad at a speed of 50 miles an hour. One of the most remarkable features of this motor, in addi-

tion to its great strength, is the small amount of space that it occupies. A pair of these motors can easily be placed on a double truck with a 6-ft. wheel base, as shown in the *Railroad Gazette* of Aug. 6, 1897, page 553. Fig. 5. The coming year may see this motor used extensively on the elevated railroads of Chicago and Greater New York.

At the present writing the sales of the Walker Com-

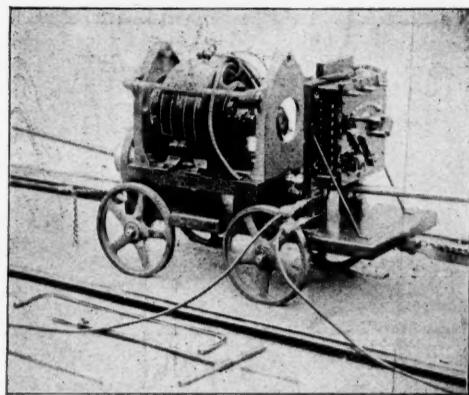


Fig. 1.—Motor Mounted to Drive Drills for the Harrington Rail Bond.

pany for the current year are greatly in excess of those of any preceding year.

S. H. SHORT, Vice-President.

A SUMMARY BY THE GENERAL ELECTRIC COMPANY.

*General Electric Co.,  
New York, Oct. 13.]*

During the year the railroad business has shown very tangible signs of a complete revivification. The demand for motors, controllers and general supplies coming under the head of the maintenance account has been especially great, and a review of the orders has plainly shown that a large number of orders were placed from sheer necessity, i. e. that the roads could no longer put off the purchase of necessary supplies. In the field of installations of city railroads, that is, complete plants, no especial activity has been manifest, but during the past year the tendency to install roads which may be classed under the head of suburban, operated at higher

Haven & Hartford has in mind, we are not in a position to divulge, but it may be assumed that the application of electricity will not be confined to these two branches of the system.

Two G. E. electric locomotives, one of 30, the other of 40 tons, are now used in switching service on the New York, New Haven & Hartford at Taftville and at New Haven, Conn.

On Oct. 9 the three 96-ton electric locomotives of the Baltimore & Ohio, which have carried on the freight service of the tunnel during the past year, were placed on the passenger schedule also.

Attention should be called to the Central London Underground Railway, already mentioned by the *Railroad Gazette*, the contract for the entire electrical and steam equipment for which was awarded to the British Thomson-Houston Co., Ltd., of London, affiliated to us, and which could supply a complete railway installation, including every electrical device from the generator to the car lamp.

In elevated roads we have made no further progress since the last convention, unless it be in the motor equipment of certain Chicago railroads, notably the "Alley 'L'" and the Brooklyn Bridge Railroad. Meanwhile, upon the experimental track, nearly two miles long, which we have found necessary to lay down, at Schenectady, tests of train equipment and train acceleration are carried on daily. We look upon this as valuable missionary work.

The conduit, or underground contact system, has found especial favor in New York, where the Metropolitan Traction Company has adopted it for all its new electrical development in the city of New York. The experience of the past two winters in the operation of the first line laid down, on Lenox avenue, having been pronounced satisfactory, the Metropolitan Traction Company has felt warranted in making the wide extensions to this system.

The application of long-distance transmission of power by electricity to railroad service also shows encouraging signs. During the past two years the transmissions of current from Niagara Falls to Buffalo, 21

which are on the top floor of the power station of the Third Avenue Railroad at Thirty-eighth street, are run by power generated on the ground floor, and the rent of the space occupied by the business department of that magazine also includes the cost of power, which in this case is more than is required to do the presswork. This is one of the first applications of electric motors for driving the different machinery of a large printing es-

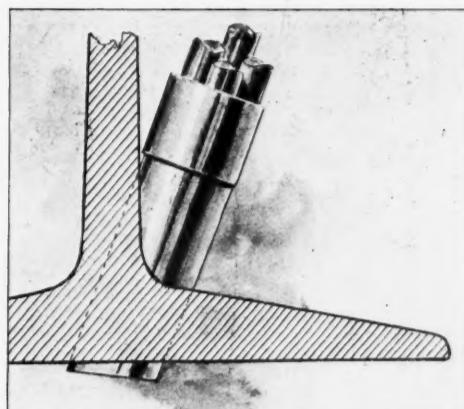


Fig. 4.—The Harrington Diagonal Bond.

tabishment, and their reliability, compactness and cleanliness especially commend them.

One is attracted particularly by the compactness of the machines with the motors. For example, two new machines, each with a capacity for printing and folding 27,000 complete double sheets in 10 hours, are operated by 15-H. P. motors, and in each case these are placed entirely out of the way under the machine itself. At present six 7½-H. P. Lundell motors, running at 1,000 revolutions and two 4-H. P. motors drive the larger printing presses, while two 1-H. P. motors and one ½ H. P. motor work the folders. A 5-H. P. motor, running at 1,140 revolutions a minute, drives a hydraulic pump which produces a pressure of 45 tons between two blocks, between which are placed a large number of complete magazines ready to be tied and stored or sent away.

One of the reasons attributed for the successful working of the motors is that motors were put in to do work that electrical engineers generally claim can be done by much smaller machines.

The Harrington Rail Bonds.

The best method of leading the return current back to the power station in order to avoid electrolytic action on the pipes in the vicinity of the road and also to save actual energy has been discussed many times from about every standpoint. The importance of the question is fully realized, and because of its importance many efforts have been made to minimize this loss on the different roads. Proper bonding offers many advantages and during the past few months bonds of a somewhat novel construction and an entirely new method of fixing them in the rails have been brought forward by the Harrington Rail Bonding Co. In their construction nothing but pure copper is used, and no solder or other material of low conductivity is employed in making the connections. Four wires are used in the bonds, which give a greater carrying capacity for the current than a

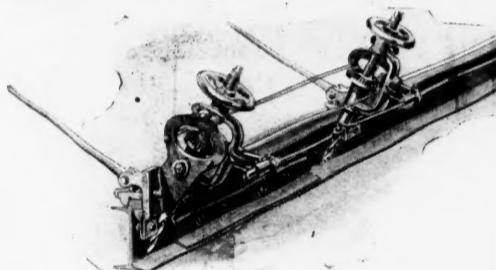


Fig. 3.—Motor and Drills in Operation.

speeds than roads confined to intraurban traffic, as well as interurban roads, operated at still higher speeds, has been very strongly apparent.

Such interurban roads as have been installed by us partake largely of the steam road character. The equipment is virtually steam road equipment minus the locomotive, and the speeds attained fully equal those on the first-class steam roads. The Cleveland & Lorain road in Ohio is operating cars of standard steam road size at speeds up to 50 miles an hour. The Washington, Alexandria & Mt. Vernon line is running its cars on the steam road tracks in between the steam trains.

In June of this year that branch of the New England

miles; Willamette Falls to Portland, Ore., 12½ miles; from Folsom to Sacramento, 24 miles; from the San Joaquin to Fresno, 36 miles; from Lowell, Mass., to Nashua, N. H., have given satisfactory evidence of the feasibility of power transmissions, and no project of this character presented to us but contemplates the use to some extent of the power transmitted for railway purposes.

The work of our foreign allied companies is also very encouraging. They are working in a fallow land with the probable result of a heavy harvest.

The British Thomson-Houston Co. has recently secured the contracts for the equipment of the Dublin Tramway's system, as well as for the systems of Madrid and Barcelona, in addition to other important ones in England and her colonies. The Union Electricitäts-Gesellschaft of Berlin is pushing forward its work into all branches of electric lighting and power, as is the Cie Française Thomson-Houston of Paris.

So far as we are concerned, the outlook for 1898 is most hopeful and attractive.

THE KINETIC STEAM-STORAGE MOTOR.

*Kinetic Power Co.,  
New York, Oct. 8]*

For the past year we have been busy preparing to do business, both in this country and abroad. Our recent tests have only served to emphasize the facts that direct steam is to-day the most economical power, and that, as we employ it, it is far less objectionable and hazardous than any other form of mechanical power for street railroads. We have installed our system on the Babylon (L. I.) Railroad, where property owners have signed to allow its use, although they would not allow electricity.

We are now arranging to build the motors on an extensive scale for use on street roads, and as feeders to steam railroad trunk lines, and are designing a style of motor cars for runs of from 35 to 50 miles with one charge, and for speeds of 35 miles an hour, for both freight and passenger service.

ARTHUR P. DODGE,  
President and General Manager.

Printing Presses Driven by Electric Motors.

For over a year the presses that print monthly from 250,000 to 300,000 copies of McClure's Magazine have been driven by independent electric motors of 15-H. P. and under. In this particular case the cost of motive power does not enter into the consideration of the relative advantages of different methods. The presses,

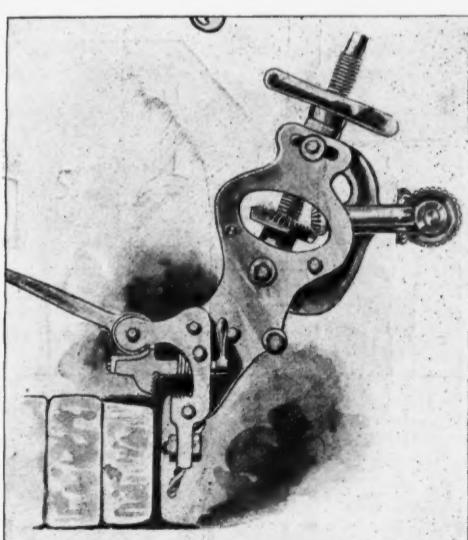


Fig. 5.—Drill Clamped to Girder Rail.

single wire of the same cross-section. Not only have new bonds been introduced, but with them complete machinery for drilling the holes in the rails has been designed. The accompanying illustrations show the construction of the bonds and machinery employed.

The engraving Fig. 1 shows the electric motor mounted on wheels so that it can be drawn by hand to different positions along the track. This motor receives its

road running from New Britain to Hartford was equipped for electric traction. This installation was noticed in your columns at the time. Its operation has been successful and has demonstrated clearly that the schedule, as carried out by the electric cars, could not possibly be undertaken by the former steam locomotives. What new developments the New York, New

power from the trolley wire by means of a hook-pole, which makes connection with the motor. Four drilling machines, all similar in construction (shown in Figs. 2 and 5) are directly connected to this motor in a manner

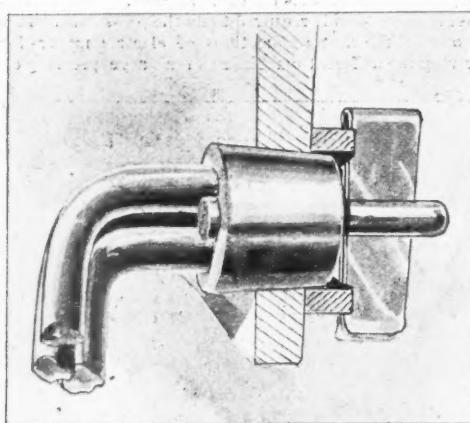


Fig. 6.—The Harrington Horizontal Bond.

shown by the engraving, Fig. 3. The method employed in drilling is as follows: The motor car is brought to a position near the center of the rail and the four drilling machines are placed in the correct positions and the

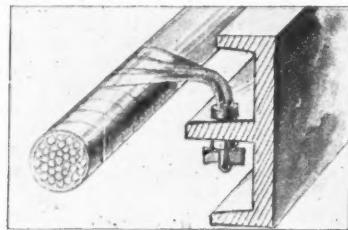


Fig. 7.—Proposed Method of Connecting Feeder Cable with Conductor Rail in Electric Conduit Roads.

handles thrown over, as seen in the illustration, thus clamping the machines to the rail. When the four are in place connection is made with the trolley current and the motor, and the four holes are drilled simultaneously. The entire time required for this is about 1½ minutes. Fig. 4 shows the

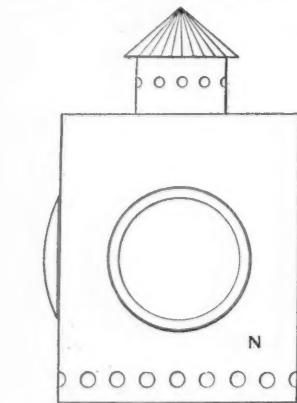


figure. After the bond is driven home, the steel at the top of the hole is crimped into the copper. A test to remove one of the bonds thus secured showed that it required a constant load of 2,950 lbs. applied until the plug was entirely removed; whereas a pull of but 2,100 lbs. sheared off the key in a keyed bond of the same type. The area of the contact surface of one of these diagonal holes is nearly 2½ times as much as obtained by a horizontal hole through the web of the rail. It is a well-known fact that the area of contact surfaces of copper and steel should be at least seven times the sectional area of the bond in order to secure the minimum loss of energy in the return current, and the cross-section of the copper bond should be about one-seventh of the contact in the rail. These conditions are fully met in the Harrington bond.

The different parts of the drilling machine are best seen in Fig. 5. It will be observed that proper clamps and set screws are provided so that the machine can be placed on any rail and a hole of any desired angle within certain limits can be drilled by very simple adjustment.

Rails are often delivered drilled for horizontal bonds, and in those cases the Harrington special type of horizontal bond is used. Fig. 6 shows the method employed in keying the bond to the rail so that the constant jar of moving trains will not loosen it and thus lose the good of possibly all the other bonds. After the plug is driven in the hole, after the latter is reamed and the key is driven in place, it is believed that no amount of jarring or knocking can loosen it. The length of these bonds (30 in.) also makes it less liable to be moved from its first position in the rail. Horizontal bonds have just been placed on the Jerome Avenue line of the Union Railway Company of New York City. The diagonal bonds placed in the Mt. Vernon line show a decrease in loss of over 50 per cent., and a notable drop of the load at the central station has been observed. Fig. 7 shows a proposed method of joining a feeder cable to the conductor rail in conduit roads. This arrangement is for the purpose of securing a maximum contact surface between the flexible copper sheets or ribbons and the exposed feeder cable.

Much good bonding is often wasted because the current fails to jump special work, bridges, etc. To meet this, Harrington bonds are made in some cases 150 ft. or more in length to meet the required conditions.

One of the interesting things in connection with the company's method of doing a contract job is its daily report card. These are postal cards on one side of which are spaces to be filled out by the Superintendent in charge of the work and mailed each night to the company. These items cover such subjects as the number of machines working, the men employed, bonds used, delays and their causes, expenses and location of work. In this way the business office is perfectly familiar with what is being done by their workmen. In 50 working days the company has placed 8,000 bonds in the rails ready for service.

#### Pflasterer's Combined Switch and Distant Signal Movement.

Mr. George S. Pflasterer, Inspector of Signals of the Chicago & Eastern Illinois, has recently patented a combined switch and distant signal stand, to take the place of the separate switch and signal stands now used.

In the new stand the parts are operated by a single lever, which is thrown one way to set the signal and open the switch, and in the opposite direction to close the switch and clear the signal. The switch is locked both in the open and the closed positions.

Fig. 1 is an elevation with casing of one side removed,

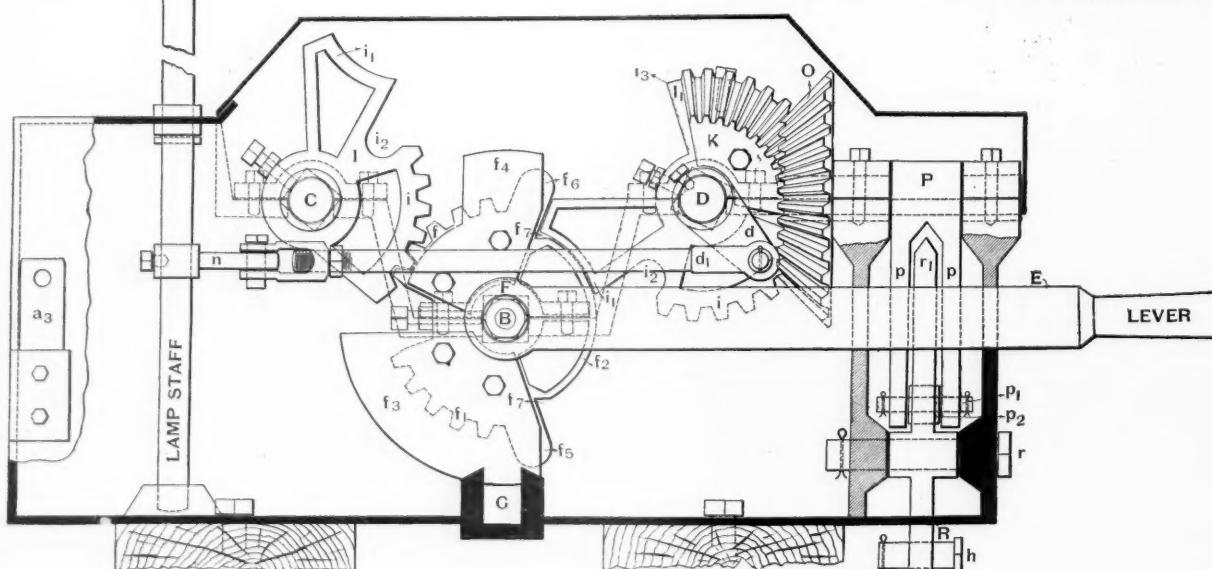


Fig. 1.—Pflasterer's Combined Switch and Distant Signal Movement.

method in which the end of one of these bonds is placed in a diagonally drilled hole. After these holes have been drilled they are reamed to the exact taper of  $\frac{1}{8}$  of an inch to the foot, the bonds being rolled with a true surface and coned to this taper. The bonds are driven into place by striking the shoulder, shown in the

case is 12 in. wide, 17 in. high and 32 in. long. Fig. 2 is an end view showing the manner in which the switch rod is attached, and Fig. 3 shows the manner of attaching the distant signal wires where the signals are operated at a greater distance than 1,500 ft. For signals less than 1,500 ft. from the switch the double-stroke attach-

ment shown in Fig. 3 is not used. Pipe connections also can be used on signals placed at short distances.

By reference to Fig. 1 it will be seen that the parts are enclosed in a metal case with a tight-fitting cover. The operating lever E and the signal connections are arranged outside of the case and can be placed on either side at will. In this way the lever can always be put on the side of the stand next to the track, while the signal

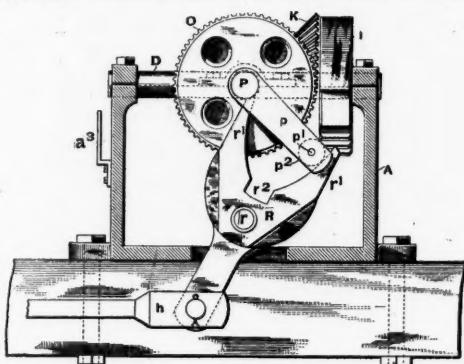


Fig. 2.—End View.

wires are on the farther side out of the way of the man operating the switch. The lamp staff can be made of any desired height.

There are three square shafts, B, C, D, journaled in bearings in the sides of the case. The ends of the main-shaft B project through the casing and are squared to receive the operating lever E. Secured to the main-shaft B, inside the casing, is the driving wheel F, having two segmented gears f<sub>1</sub>, each occupying about one-quarter of its periphery, with a short interval between. The remainder of the wheel is smooth, as at f<sub>2</sub>. Adjacent to the segment gear f<sub>1</sub> is a locking quadrant or rim f<sub>3</sub>, whose edge projects beyond the tops of the gear teeth. Adjacent to one end of the segment gear f<sub>1</sub> and diamet-

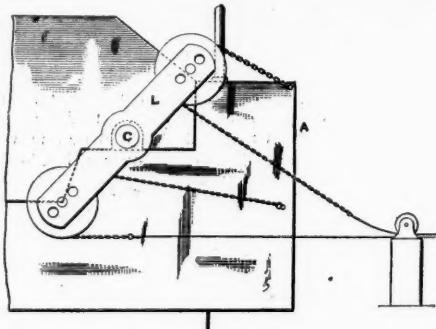


Fig. 3.

rally opposite one end of the quadrant f<sub>3</sub> is a short, similar-looking rim f<sub>4</sub>. At one end of each of the segment gears is a rounded tooth f<sub>5</sub>, f<sub>6</sub>, respectively, which projects radially beyond the teeth of the gear. At the base of each long tooth, where it joins the smooth portion f<sub>2</sub> of the wheel, there is a notch f<sub>7</sub>.

The locking rims f<sub>3</sub>, f<sub>4</sub> are secured to the driving shaft, being bolted to the driving wheel so as to permit of adjustment. These rims can be placed on either side of the wheel F, as may be most convenient, and they can be shifted from one side to the other, if necessary, when the switch stand is moved to a new location.

The function of the locking rims is to enter a transverse notch in the lock rod G, attached to and moving with the switch point, in order to positively hold the switch point open or closed. The rim f<sub>3</sub> locks the switch point closed and the rim f<sub>4</sub> locks it open.

The shaft C operates the signal and shaft D the switch. These shafts are geared to the shaft B by means of the driven wheels I, I<sub>1</sub>, having segment gears so as to be operated in succession instead of simultaneously. These wheels are duplicates, but are so arranged that one is right-handed and the other left-handed and consist of segment gears i and projecting lock segments i<sub>1</sub> with a deep notch i<sub>2</sub> between the gear and the lock segment. The quadrant of the periphery opposite this notch is recessed or shouldered at i<sub>3</sub> and the

wheel I<sub>1</sub> has a quadrant bevel gear K set in between these shoulders and bolted to the wheel. The bevel gear can be placed on either side of the wheel to suit the case.

The ends of the shaft C extend beyond the sides of the casing to receive on either end the crossarm L, Fig. 3, to which the distant-signal wires are attached.

The shaft *D* is arranged to operate the switch signal *N*. This is accomplished by means of a crank *d* on the shaft connected by means of a rod *d*<sub>1</sub>, with a crank arm *n* on the staff of the lamp, so that a quarter turn of the shaft *D* will give the lamp a quarter turn. The lamp staff is stepped in a socket in the casing and rises through a bearing in the top of the casing.

lution of the lever unlocks the switch and closes it and sets the signal *N* at safety. The second quarter revolution of the lever locks the switch point closed and clears the distant signal.

The shafts *B*, *C* and *D* are reversible end for end, so that the wheels *F*, *I* and *I*<sub>1</sub> can be placed on the opposite side of the casing in order to get the proper push or pull

motors. Consequently, the demand on the trucks of the cars used in heavy service by electric roads is greater than that for cars having the same weight on the rails and running at the same speed on a steam road. To meet the growing requirements there has recently been brought out by the Peckham Motor Truck & Wheel Co. a complete series of trucks especially designed for high speeds and heavy loads. Two of the series are illustrated in this issue. These do not differ materially from some of the better known types of the Peckham truck, yet each one has its distinctive features, which in the newer types are quite marked.

Those shown in this issue are built on the general pattern of the No. 14 truck, which was brought out about six months ago, but are made of much heavier material throughout. A truck of even greater strength designed for extra heavy suburban and elevated railroad and Trunk line service has also very recently been designed. The 14A and 14B have the swinging bolster, which has met with so much favor in steam railroad practice, while the very latest designs, such as those shown herewith are triple cushioned. It is our purpose at this time to describe only the 14A and 14B trucks, leaving the maximum traction and other trucks of very recent construction for future consideration.

The No. 14A truck, shown in Figs. 1, 2, 3 and 4, is more heavily constructed in all its parts than the No. 14. Instead of a stationary bolster working on guide pins, provided in the latter, this truck has a swing bolster, *A*, Fig. 2, made up of two channels, *BB*, set on edge and held together by the cover plates *CC* and the female swivel plate *D*. This bolster, *A*, is carried on the spring plank *F* by means of the half elliptic springs *G* and the two spiral

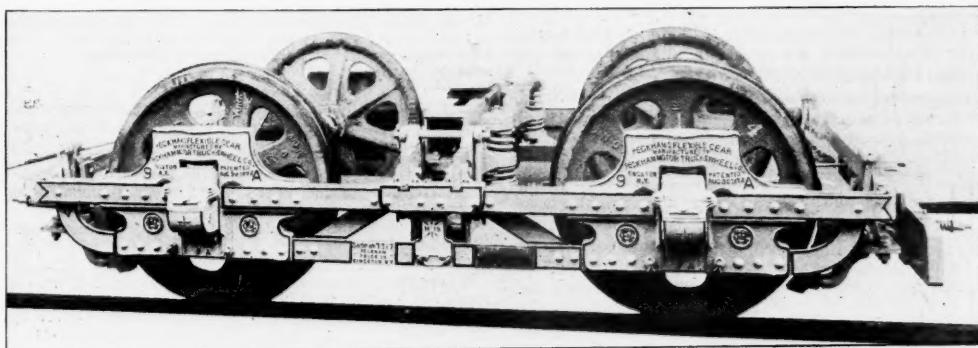


Fig. 1.—Peckham's Triple-Cushioned Swing-Bolster Truck 14 A.

The shaft *D* also throws the switch. Meshing with the quadrant bevel gear *K* is a bevel gear *O*, Fig. 2, secured to a short horizontal shaft *P* on which is a double crank composed of two parallel crank webs *p*, connected at their ends by a crank pin *p*<sub>1</sub>, which is provided with a roller *p*<sub>2</sub>. This crank works a rock lever *R*, to one arm of which the switch rod *h* is pivoted. The

for the switch with which the stand is used. The locking rims *f*<sub>3</sub>, *f*<sub>4</sub> can also be changed from one side of the wheel *F* to the other. In case the switch is run through backward when closed or open, thereby forcibly throwing the rods *G* and *h*, the locking rims and the crank pin *p*<sub>1</sub> will give way and save the rest of the machine. The working parts of this stand are strong and simple

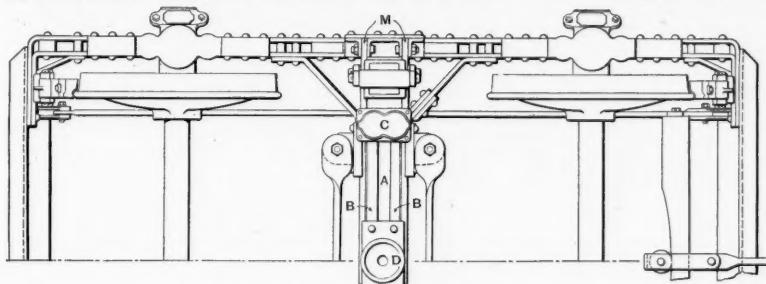


Fig. 2.—Half Plan View, Peckham's 14 A Truck.

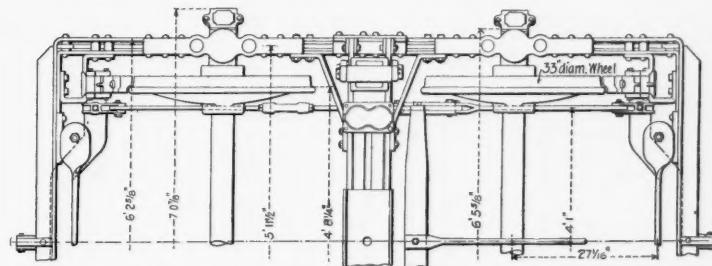


Fig. 6.—Half Plan View, Peckham's 14 B Truck.

rock-lever is mounted on trunnions *r* and has a bifurcated upper arm, between the jaws of which is the crank pin *p*<sub>1</sub>. The inner faces of the jaws *r*<sub>1</sub> are curved on an arc concentric with the shaft *P*.

At the center of the rock-lever is a notch *r*<sub>2</sub> which engages the roller of the crank pin. At each throw of the crank the rock-arm is carried to one side or the other, as

in construction and are easily accessible when repairs are necessary. This device can be connected to any switch or to any signal.

One of these stands has been in operation for a short time on the Chicago & Eastern Illinois, at Kensington Station, Chicago, where the distant signal is 1,500 ft. from the switch. At this point there is considerable

nest springs *H H*. The side bearing plates attached to the car bolster and bearing upon the cover plates admit of a limited rocking motion of the car, governed by the stiffness of the spiral nests *H H*. This motion adds greatly to the ease of riding, as it permits the wheels on one side of the truck to rise independently of the car body.

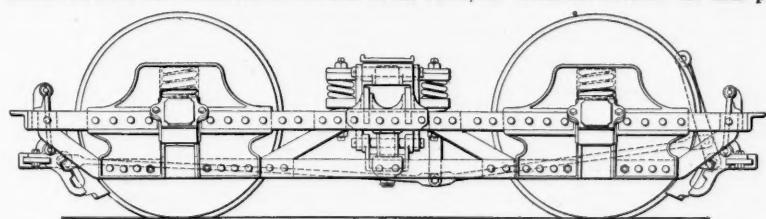


Fig. 3.—Side Elevation of 14 A Truck.

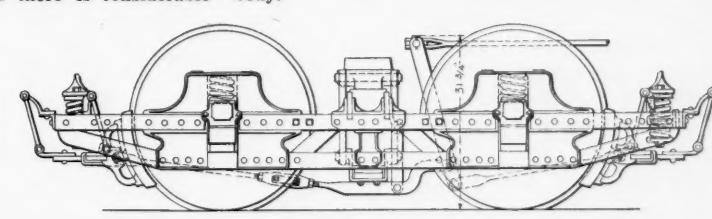


Fig. 7.—Side Elevation of 14 B Truck.

the case may be. At the end of its stroke the rock-arm is securely locked against accidental movement by reason of the curved face *r*<sub>1</sub> being normal to the axis of the crank.

The operation of the stand is as follows: When the switch is set for the main track and the signal is clear, the lever *E* lies to the right, as shown in Fig. 1, being retained by a clip on the casing. The segment-gear *f* on the driving-wheel meshes with segment gear *i* on the wheel *I*. The wheel *I*<sub>1</sub> is rigidly locked by reason of its locking segment *i*<sub>1</sub> lying against the smooth portion *f*<sub>1</sub> of the driving-wheel *F*, the outer edge of the lock segment being concave, with the same curvature as the portion *f*<sub>2</sub> of the wheel. The locking rim *f*<sub>3</sub> is engaged with the notch in the lock rod *G*. If the lever *E* be lifted to an upright position, through a quarter revolution, the wheel *I* is caused to make a quarter turn, which throws the distant signal to danger. The lock segment *i*<sub>1</sub> on the wheel *I* comes down in contact with the smooth portion *f*<sub>2</sub> of the wheel *F*, the long tooth *f*<sub>6</sub> insuring the simultaneous movement of the two wheels until the lock segment is fairly in contact and the notch *f*<sub>7</sub> permitting the corner of the lock segment to pass freely. The wheel *I* is thus locked against any backward movement which might be induced by the tension on the signal connections. The gears *f* and *i* having now become disengaged and the locking rim *f*<sub>3</sub> having passed out of the notch in the lock rod *G*, the continued movement of the lever *E* through another quarter revolution causes the gear *f*<sub>1</sub> to mesh with the gear *i* on the driven wheel *I*<sub>1</sub> and give this wheel a quarter revolution. This turns the signal *N*, and, also, by rotating the bevel wheel *O* a quarter turn, the crank *p* is caused to move through 90 deg., rock the lever *R* (Fig. 2), and throw the switch. The locking rim *f*<sub>4</sub> then passes into another notch in the lock rod which has moved with the switch point, thus locking the switch in its open position. The lever *E* is held in this position by a clip *a*<sub>3</sub> on the casing.

When the operation is reversed, the first quarter revolu-

tioning and so far the new stand has worked satisfactorily.

#### Peckham's Swivel Trucks for High-Speed Electric Service.

A paper on "Trucks" at the St. Louis meeting of the American Street Railway Association contains the following statement: "As interurban service is almost equivalent to that of the steam roads; for this service,

The spring plank *F* is supported by the four links *J*, which in turn are carried on the two transverse bars, which rest in pockets on the side frame of the truck. At each end of these transom bars, *M*, Fig. 2, are located spring pockets *LL*, Fig. 4. The rubber cushions *NN*, one at each end, are placed as seen in the figure. These cushions support the male bearings *KK*, to which the links *JJ* are secured. The rubber cushions, in addition to acting as springs, break the force of the blow between the rail and the car. The transom bars previously

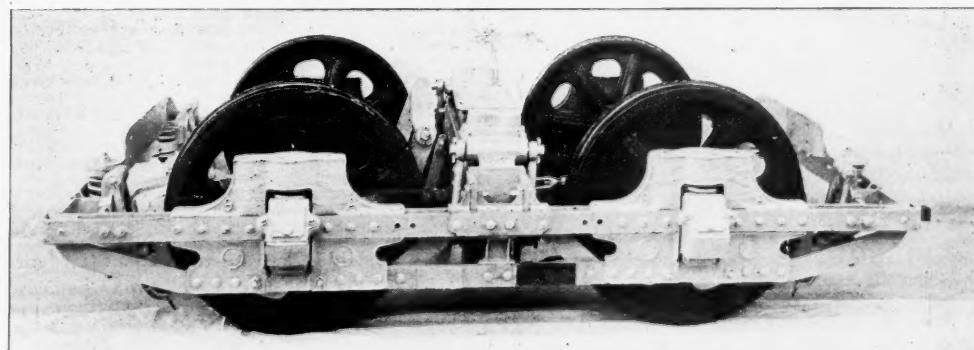


Fig. 5.—Peckham's Short Wheel-Base, Swing-Bolster Truck, 14 B.

pivotal trucks, having regular swing beams, equalizers, elliptic springs, and all the parts of the steam road truck, are entirely satisfactory." A moment's consideration, however, will show the fallacy in this statement. In the case of the steam cars, the trucks carry the weight of the car which is drawn along; while in the other case the entire load is driven by power from the truck, which also carries the additional weight of the

referred to are secured to both side frames together with the end cross members, holding them in rigid alignment. The transoms *M* likewise act as a guide for the bolster, preventing it from moving in a direction longitudinal with the car, and also carry the nose bars which support the motor through riveted pockets. The four links *J* have a slight outward inclination shown in the cross-section. The object of

this is to raise that side of the car body toward which the bolster moves when striking a curve, and to give the effect of an additional elevation of the outside rail of a curve.

The 14B truck is designed with a short wheel base for railroads with curves of short radius. It is possible to make a wheel base in this design as low as 4 ft., but a shorter wheel base than 4 ft. 6 in. is not approved by the company when the truck is used on a 4 ft. 8½ in. gage. A wheel base not shorter than 4 ft. is recommended when the cars are run on a 3 ft. 6 in. gage. A close examination of the detail drawings of 14A and 14B trucks shows that the side frame and swinging bolster of these trucks are in every way the same, and the parts of the two are interchangeable. There is one marked difference, how-

ever. When no carrier is being sent the air current from the delivery pipe passes directly into the tube through one arm of the cradle, but when the cradle is in the act of being thrown, to place the carrier in position, the current is automatically switched off and goes through a by-pass, being returned against the rear end of the carrier as soon as it is in position, thus starting it on its journey through the tube. Immediately after the carrier has left the cradle the latter is automatically returned to its original position. This machine is regulated by a time lock, which allows a headway of not less than six seconds to each carrier.

At the end of the receiving tube is a gate, so arranged and regulated as to effectually close the end of the tube, only being opened by the impact of the carrier as it is

shot against it. The air current passes off continually in a direction at right angles to the tube through a valve, to a pipe which conducts it to the tank in the engine room. The gate closes automatically as soon as the carrier has passed through to the receiving table outside, the small quantity of air which passes out with it not being sufficient to hold the gate open.

The transmitting machinery at the sub-station is practically the same as that at the General Postoffice, but the receiver is somewhat different, being arranged for a continuous passage of air without loss from the receiving tube to the transmitter. This is effected by means of a sleeve placed on the end of the receiving tube, the air current passing from the tube through the sleeve to another tube and thence to the transmitter. The carrier, when it arrives, passes through a gate somewhat similar to that at the General Postoffice, into a short piece of tubing from which, after the gate has closed, to prevent loss of air, it is dropped on to the receiving table.

A plant which in its essential features is similar to that described is now being installed in Boston, and is expected to be ready for operation by Nov. 10.

#### Definitions of and Regulations for the Use of Interlocking Switches and Signals.

*Adopted by the American Railway Association, Oct. 6, 1897.*

##### INTERLOCKING.

###### DEFINITIONS.

*Interlocking.*—An arrangement of switch, lock and signal appliances so interconnected that their movements must succeed each other in a pre-determined order.

*Interlocking Plant.*—An assemblage of switch, lock and signal appliances, interlocked.

*Interlocking Cabin.*—A building from which an interlocking plant is operated.

*Interlocking Signals.*—The fixed signals of an interlocking plant.

*Home Signal.*—A fixed signal at the point at which trains are required to stop when the route is not clear.

*Distant Signals.*—A fixed signal of distinctive character used in connection with a home signal to regulate the approach thereto.

*Dwarf Signal.*—A low fixed signal.

###### RQUISITES OF INSTALLATION.

1. The interlocking of signals with switches, locks, railroad crossings, or drawbridges, so that a clear signal cannot be given unless the route to be used is clear and stop signals displayed for all conflicting routes.

2. The interlocking of switches, locks, railroad crossings, drawbridges and signals through levers, or their equivalent.

3. Interlocked levers, or their equivalent, by which switches, locks and signals are operated.

4. Signals of prescribed form, the indications given by two positions, and in addition at night by lights of prescribed color.

5. The apparatus so constructed that the failure of any part directly controlling a signal will cause it to give the normal indication.

6. Signals, if practicable, either over, or upon the right of, and adjoining the track to which they refer.

7. Semaphore arms, that govern, displayed to the right of the signal mast as seen from an approaching train.

8. The normal indication of Home signals—*Stop*; (of Distant signals—*Caution*).

9. The apparatus so constructed that the failure of any part directly controlling a switch or lock will prevent the display of the clear signal.

10. Facing-point locks, for all facing-point switches in main routes.

11. Detector bars, or their equivalent, for all facing point switches in the main routes.

12. Pipe, or its equivalent, compensated for changes in temperature, for connecting levers, in mechanical interlocking, with switches and locks.

13. Latch locking, or its equivalent.

14. The established order of interlocking such that:

A clear home signal cannot be displayed until derails or diverging switches, if any, in conflicting routes are in their normal position, and the switches for the required route are set and locked;

The display of a clear home signal shall lock all switches and locks in the route as far as the point to which such signal gives permission to proceed, locking all opposing or conflicting signals and releasing the corresponding distant signal, where such signal is used;

Where distant signals are used the display of a clear distant signal shall lock the home signal in the clear position.

15. Interlocking and block signals, interconnected where both are operated from the same cabin.

###### ADJUNCTS.

The following may be used if desired: (A) Dwarf signals. (B) Distant signals. (C) Bolt locking of switches, or its equivalent, by signal connections. (D) Derails, or diverging switches, for railroad crossings, drawbridges, junctions, and in sidings connected with the running tracks: Normal position—Open. (E) Electric locking of derails, facing-point switches and

drawbridges so that they cannot be opened after a train has passed over them. (F) Detector bars, or their equivalent, at railroad crossings and junctions. (G) Repeaters or audible signals to indicate the position of signals to the signalmen operating them. (H) Annunciators indicating the approach of a train, or for other purposes. (J) Route indicators. (K) Torpedo placers.

###### RULES FOR INTERLOCKING.

801. Interlocking signals, unless otherwise provided, do not affect the rights of trains under the time table, or train rules; and do not dispense with the use or the observance of other signals whenever and wherever they may be required.

###### 802. HOME SIGNALS.

Signal.	Occasion for use.	Indication.	Name.
Color.	The signal will be displayed when	For enginemen and trainmen.	As used in rules.
(a) Red	Route is not clear.	Stop.	Stop signal.
(b) —	Route is clear.	Proceed.	Clear signal.

Where the semaphore is used, the governing arm is displayed to the right of the signal mast as seen from an approaching train, and the indications are given by positions:

Horizontal as the equivalent of (a).  
Vertical or diagonal —\* as the equivalent of (b).

###### DISTANT SIGNALS.

Signal.	Occasion for use.	Indication.	Name.
(c) —	Home signal at (a).	Proceed with caution to the home signal.	Caution signal.
(d) —	Home signal at (b).	Proceed.	Clear signal.

Where the semaphore is used, the governing arm is displayed to the right of the signal mast as seen from an approaching train, and the indications are given by positions:

Horizontal as the equivalent of (c).  
Vertical or diagonal —\* as the equivalent of (d).

\* Angle above or below the horizontal.

###### SIGNALMEN.

803. The normal indication of Home Signals is (a), as above; (of Distant signals (c), as above).

804. Levers, or other operating appliances, must be used only by those charged with the duty and as directed by the rules.

805. Signal levers shall be kept in the position giving the normal indication, except when signals are to be cleared for an immediate train or engine movement.

806. When the route is clear the home (and distant) signals shall be cleared sufficiently in advance of approaching trains to avoid delay.

807. Signals shall be restored to the normal indication as soon as the train or engine for which they were cleared has passed.

808. If necessary to change any route for which the signals have been cleared for an approaching train or engine, switches must not be changed or signals cleared for any conflicting route until the train or engine, for which the signals were first cleared, has stopped.

809. No attempt shall be made to move a switch or facing-point lock when any portion of a train or an engine is standing on or closely approaching the switch or detector bar.

810. Levers must be operated carefully and with a uniform movement. If any irregularity, indicating disarranged connections, be detected in their working, the signals shall be restored to the normal indication and the connections examined.

811. Signalmen must observe, as far as practicable, whether the indication of the signals corresponds with the position of the levers.

812. If any signal fails to work properly its operation shall be discontinued and the signal secured so as to give the normal indication until repaired.

813. If necessary to discontinue the use of any fixed signal, hand signals must be used and — notified.

814. If there is a derailment or if a switch is run through, or if any damage occur to the track or interlocking plant, the signals shall be restored to the normal indication, and no train or switching movement allowed until all parts of the interlocking plant and track liable to consequent injury have been examined and are known to be in a safe condition.

815. If necessary to disconnect the switch from the interlocking apparatus the switch must be securely fastened.

816. During storms or drifting snow special care must be used in operating switches. If the force whose duty it is to keep the switches clear is not on hand promptly when required, the fact shall be reported to —.

817. During cold weather the levers must be moved as often as may be necessary to keep connections from freezing.

818. If any electrical or mechanical appliance fails to work properly — shall be notified and only duly authorized persons allowed to make repairs.

819. Signalmen will be held responsible for the care of the cabin, lamps and supplies; and of the interlocking plant, unless provided for otherwise.

820. Signalmen must not make or allow any unauthorized alterations or additions to the plant.

821. When switches or signals are undergoing repairs, signals must not be given for any movements which may be affected by such repairs, until it has been ascertained from the repairmen that the switches are properly set for such movements.

822. Lights in interlocking cabins shall be so placed that they cannot be seen from approaching trains.

823. Lights shall be used upon all fixed signals from one hour before sunset until one hour after sunrise, and whenever the signal indications cannot be clearly seen without them.

824. Signalmen must have the proper appliances for hand signaling\* ready for immediate use. These must be used when the proper indication cannot be given by a fixed signal.

825. Hand signals must not be used when the fixed signals are in proper working order. Where hand signals are authorized they must be given from such a point and in such a way that there can be no misunderstanding on the part of enginemen or trainmen as to the signals displayed, or as to the train or engine for which they are given.

826. If any train or engine passes a stop signal the fact,

\* Hand signaling includes the use of lamp, flag, torpedo and fusee signals.

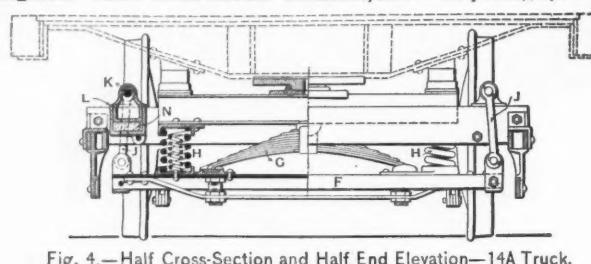


Fig. 4.—Half Cross-Section and Half End Elevation—14A Truck.

ever, in the construction of the two. There being a short distance between the axles in the 14B, it has been designed so that the motors are suspended between the outer crossbars of the truck and the axles. The practical result of this is to make the truck run very steadily, inasmuch as the motors being suspended at the extreme ends of the truck act as counterbalances.

#### Pneumatic Mail Tubes in New York.

On Monday, Oct. 11, the Postoffice Department of New York City began operating a system of pneumatic mail tubes between the General Postoffice and postal substation P, in the Produce Exchange Building. The plant has been put in by the Batcheller Pneumatic Tube Co., of Philadelphia, for the Tubular Dispatch Co., of New York.

Although the mail tubes are in operation in New York only over the route above mentioned, they are now being put in between the General Postoffice and sub-station H, in the Grand Central Palace, at Forty-fourth street, and it is expected that they will be in operation over this line before December 1. Tubes have also been laid from the General Postoffice to the end of the Brooklyn Bridge, with the intention of putting in a line over the bridge to the Brooklyn General Postoffice; but this work has been temporarily suspended. It is the intention, however, to connect all of the postal sub-stations in New York City with the General Postoffice, which with the line to Brooklyn will greatly increase the speed of transfer.

This system of pneumatic tubes is the invention of Mr. B. C. Batcheller, who is Chief Engineer of the Batcheller Pneumatic Tube Co., Mr. C. A. Budd being Resident Engineer of the company in New York. Tubes similar to those now in use in New York, but of smaller diameter (only 6 in.), have been in use for the past five years between the different postal stations of Philadelphia.

The tubes in New York consist of cast-iron pipes in 12-ft. lengths and 8½ in. internal diameter, being bored smooth and the joints being made with great care, to get exact alignment. They are laid side by side under the city streets, taking the most direct line that could be found between the different stations. After being bored out, these pipes are left ½ in. thick. All bends are made by means of brass tubing of 8½ in. internal diameter, the greater size being to prevent jamming of the carriers. These brass tubes are bent to not less than 8 ft. radius. Short lengths of iron pipe with a conical bore are used at the joints with the brass tubes, to gradually increase and reduce the bore.

The carriers are cylindrical, being 2 ft. long and 7 in. in internal diameter, and have a capacity for from 600 to 800 letters. They are made of sheet steel ½ in. thick, and open at one end, the cover for this opening being fitted with a device which locks it only when the carrier is in the tube. Each carrier is fitted with two bearing rings of a fibrous material, placed one near each end; these rings are the only parts of the carrier which touch the tubes, and thus reduce friction to a minimum. The rings last for about 1,000 miles of travel.

The carriers are propelled through the tubes by a continuous current of air, generated by a Rand duplex compressor, placed in the basement of the General Postoffice. This air current passes through one tube to the sub-station, and returns through the other tube to a tank in the engine room, from which tank, in turn, the air is again taken up by the compressor, thus forming a complete circuit. The compressor, whose cylinders are 24 in. diam. × 20 in. stroke, were built by the Rand Drill Co., from specifications of the Batcheller Pneumatic Tube Co. They can deliver the air at 11 lbs. pressure, although 6 lbs. is all that is now being used. The speed of the air current, and consequently of the carriers, is about 3,000 ft. per minute.

The transmitting and receiving machinery in the General Postoffice is placed on the main floor of the building. At the end of the transmitting tube is a cradle, by means of which the carrier is thrown into posi-

with the number of train or engine, shall be reported to —

827. If a signalman has information that an approaching train has parted, he must, if possible, stop trains or engines on conflicting routes, clear the route for the parted train, and give the "Train Parted" signal to the engineman.

828. Signalmen must observe all passing trains and note whether they are complete and in order and the markers properly displayed.

829. Only those whose duties require it shall be allowed in the cabin.

#### ENGINEMEN AND TRAINMEN:

830. Trains or engines shall be run to but not beyond a signal indicating stop.

831. If after accepting a clear signal it is changed to a stop signal before it is reached, the stop shall be made at once. Such occurrence shall be reported to —

832. Enginemen and trainmen must not accept clear hand signals as against fixed signals until they are fully informed of the situation and know that they are protected. Where fixed signals are in operation clear hand signals must not be given or accepted against them.

833. The engineman of a train which has parted on approaching an interlocking cabin must sound the whistle signal for "Train Parted."

834. An engineman receiving a "Train Parted" signal from a signalman must answer by the whistle signal for "Train Parted." When the train has been recoupled the signalman shall be notified.

835. Sand must not be used over movable parts of an interlocking plant.

836. Enginemen must report to — any unusual detection at interlocking plants.

837. Trains or engines stopped in making a movement through an interlocking plant must not move in either direction until they have received the proper signal from the signalman.

#### REPAIRMEN:

838. Repairmen are responsible for the inspection, adjustment and proper maintenance of all the interlocking plants assigned to their care.

839. Where the condition of switches or track does not admit of the proper operation or maintenance of the interlocking plant, the fact shall be reported to —

840. When any part of an interlocking plant is to be repaired, a thorough understanding must be had with the signalman, in order to secure the safe movement of trains and engines during repairs. The signalman must be notified when the repairs are completed.

841. If necessary to disconnect any switch it must be securely fastened before any train or engine is permitted to pass over it.

842. No alterations or additions to any interlocking plant shall be made unless authorized by —

843. Repairmen when on duty, or subject to call, must keep — advised as to where they can be found, and respond promptly when called.

#### Rules for the Operation and Maintenance of Interlocking Plants.

(Recommended by the Railway Signalling Club.)

##### Operation.

1. All signal arms must be kept normally in the horizontal position, and must not be cleared for an approaching train until such train is within a mile of the tower. Each signal arm must be returned to the horizontal position as soon as the rear end of a train has passed it. When it is necessary for the lever man to be absent from the tower, signals must be left as directed by special order.

2. A signal must not be given until it is known that the route is clear.

3. Immediately after operating a signal lever the signal must be observed to note whether the arm has assumed the proper position.

4. Passenger trains must be given precedence over freight trains, but after clearing the signals for an approaching train they must not be changed, except as per Rule 5, until after the train has passed beyond the stop signal limits of the interlocking, unless the train shall have come to a stop outside the stop signal.

5. Signals may be taken away from a train at any time, provided that anything is discovered that might endanger the safety of the train, and every effort must be made to avoid an accident.

6. When it is necessary to flag a train through the limits of an interlocking, the hand signal must be given from a point where there can be no misunderstanding as to which train is to be moved. The signals for this purpose to be given only by a green flag or light.

7. When a route is signaled in one direction only, and a movement is necessary in the opposite direction over that route, the signal lever governing the route must be unlatched to insure that the route is set. Said lever must then be put in the normal position and the train flagged through the limits of the interlocking. In such a case trains that are to make movements over conflicting routes must be brought to a stop before the home signal is cleared for them.

8. When a switch or derail is out of order so that it cannot be operated and locked from the machine, the signal or signals that protect such defective part must be kept at danger. When a movement is to be made over the route or routes affected, the defective switch or derail must be spiked for the desired route, and the signal lever or levers governing the route must be unlatched to insure that the route is set. The train must then be flagged through the limits of the interlocking. In such a case trains that are to make movements over conflicting routes must be brought to a stop before the home signal is cleared for them.

9. If a signal arm fails to assume the horizontal position when the operating lever is put in the normal position, no switch or derail must be moved or conflicting signal cleared until the arm of the defective signal has been put in the horizontal position. Said defective signal must not be operated for a train until it is known to be in working order.

10. When a signal is out of order the arm must be kept in a horizontal position. Before flagging a train past such signal its lever must be unlatched to insure that the route is set.

11. When there is a defect in the machine or locking, making it possible to clear a signal with a switch, derail or lock in the wrong position, or a conflicting signal clear, the signal or signals affected must be kept in the horizontal position, and a train must not be flagged past such signal or signals until the lever man is sure that the route is set.

12. In case a signal light is extinguished said signal must be kept at danger, and a train that has been stopped from such a cause must be flagged through the limits of the interlocking. The lamp must be relighted at the first opportunity.

13. A switch, derail or detector bar must never be moved when a train covers it, and a switch or derail must never be moved when a train is closely approaching it, unless the moving of such a switch or derail will lessen the liability of damage to life and property.

14. Levers must be handled with a steady movement,

Lever men will be held responsible for any damage occasioned by rough handling. If a lever moves unusually hard, or with unusual ease, the cause must be at once investigated. An attempt to force a lever must never be made.

15. Signals must be observed frequently during the night to ascertain whether the lights are properly displayed.

16. During freezing weather the levers must be moved frequently to prevent the connections from freezing in.

17. Lights must be displayed from one hour before sunset to one hour after sunrise, and when from fog or other cause day signals cannot be seen clearly.

18. Lights must not be placed in the tower where they can be seen from an approaching train.

19. During the day if an arm is removed from a post the trains that are affected by said signal must be stopped by a flagman, placed in advance of the signal affected, and must be flagged through the limits of the interlocking, in accordance with the instructions from the lever man.

20. At night if the red glass in a stop signal is broken, the signal arm must be kept in a horizontal position, and a red lantern must be substituted for the regular lamp. A train that has been stopped at such signal must be flagged through the limits of the interlocking.

21. At night if the green glass in a caution signal is broken, the signal must be kept in the cautionary position, and a green lantern must be substituted for the regular lamp.

22. In case of an accident or damage to any part of the apparatus, the proper officer must be notified immediately.

23. Engine men running their trains past a stop signal, or using sand or wasting water within the home signal limits of the interlocking, must be reported to the proper officer.

24. Lever men on duty must not leave the tower except in case of absolute necessity.

25. Unauthorized persons must not be permitted in the tower.

26. Whenever it is safe to do so, the switches must be operated upon the request of section men.

##### Maintenance.

27. The plant must be inspected daily.

28. All pins in crank stands, compensators, detector bars, and all bolts and nuts must be kept tight. Crank, compensator and other foundations must be kept rigid, and all boxing must be kept in repair.

29. All wire and pipe line connections must be kept in proper adjustment.

30. Glasses and lenses must be inspected daily. They must be kept in a clean condition. If any are cracked or broken, they must be replaced at once.

31. Switches must be inspected daily while in operation to see that the points fit up and are properly locked.

32. Home signal arms for the stop position, and caution signal arms for the caution position, must stand at right angles to the post, and each must stand at an angle of 30 degrees or less to the post when clear. The arms must be washed whenever the color of same becomes obscured by dirt, and painted when necessary.

33. Any part of the apparatus becoming so worn as to endanger the safe working of the plant must be renewed at once.

34. All moving parts of the plant must be kept oiled and free from grit. Care must be taken not to use too much oil, and all the old oil must be removed before reoiling.

35. The tower must be kept in a neat and orderly condition, and tools and hand signals must be ready for immediate use.

36. Lamps must be cleaned and filled daily, and must be lighted at least ten minutes before being taken from the lamp-room, in order that the flame may be regulated.

37. Any damage to the plant must be immediately investigated, and the tracks and switches in a desired route must be put in a safe condition before allowing a train to pass.

38. In case of accident or derailment, the tower man or party in charge shall take precautions to prevent any unnecessary damage to the ground works or connections.

39. Tampering with the machine locking will not be allowed. Any defects in the locking must be reported to the proper officer immediately.

40. A report of the condition of the plant, including any trouble with the lamps, must be sent daily to the proper officer, or at the end of each week, as may be ordered. A tool and material report must be sent to the proper officer at the end of each month.

##### DEFINITIONS AND RULES GOVERNING THE OBSERVANCE OF SIGNALS AT INTERLOCKED CROSSINGS AND SWITCHES.

1. Interlocking signals are of the semaphore pattern, consisting of posts with movable arms. Train movements are governed by the position of the arms by day and by the color of the lights at night. The position and form of the arms or the color of the lights displayed indicates stop, caution, or clear.

2. Signals are located to the right of the normal direction of traffic, the arms being on single or bracket posts or on posts which are located on bridges over the tracks. When bracket posts are used, the posts carrying the arms stand in the same relative position as the tracks governed. (Note.—Any exception to this rule will be covered by special order.)

3. The front view of the signal, which is the only one giving indication to trainmen, is the one in which the arms are between the post and the observer. These arms extend from the post toward the right of such line of observation.

4. The stop signal placed at or near the danger point has one or more arms with straight ends. The front side of each arm is painted red with a white stripe.

5. High stop signals, except at junction points, may have two arms on the same post. The upper arm governs the movements of trains along the main or high speed route; the lower arm along the diverging route or routes.

6. At junction points three arms may be used. The upper arm governs the movements of trains along the main or high speed route; the middle arm the route of secondary importance, and the lower arm all other diverging routes.

7. The low or dwarf stop signal has a signal arm on a post not over 5 ft. high, and governs movements of trains from side track to side track, side track to main track, and along the main track against the normal direction of traffic.

8. The caution signal, placed 1,200 ft. or more in advance of its home signal, has an arm with its forked end, the front side of which is painted green with a white stripe.

9. The rear side of the signal arm is painted white with a black stripe.

10. When the arm on a single-arm stop signal is in a horizontal position, or a red light is displayed, or when all of the arms on a two or three-arm stop signal are in a horizontal position, or all red lights displayed, stop is

indicated, and the signal must not be passed when in this position, except as per Rule 15. When the arm on a single-arm stop signal, or one of the arms on a two or three-arm stop signal is inclined downward to an angle of 60 deg. or more, or a white light is displayed, clear is indicated, and the train which is governed by said home signal may proceed.

11. When the arm on a caution signal is in a horizontal position, or a green light is displayed, caution is indicated, and a train which is governed by said signal must be so controlled that it may be stopped before reaching the home signal. When the arm is inclined downward to an angle of 60 deg. or more, or a white light is displayed, clear is indicated, or that the home signal or signals for the high speed route are clear.

12. An indication is given for each movement to be made. A train having passed through the interlocking by permission of a clear signal, must not be moved in the opposite direction before receiving a clear signal for such a movement.

13. Movements to or from side tracks or along main tracks, against the normal direction of traffic, must be made at slow speed.

14. When a signal is not visible, or the arm is not inclined downward at an angle of at least 60 deg., or the light is not shown, or a white light is shown when a red or green light should be shown, stop is indicated. In such a case a train affected by said signal must not proceed until every precaution is taken to insure safety. The trouble must be promptly reported to the lever man, and to the superintendent or trainmaster by wire.

15. If a signal is out of order, or if a movement is to be made that is not signaled, the train must be brought to a stop, and only proceed through the limits of the interlocking by taking every precaution in accordance with instructions from lever man.

16. Flying switches must not be made over interlocked switches.

17. The use of sand or wasting of water must be avoided within the stop signal limits of the interlocking.

18. No engine, train, or portion of trains, must be allowed to stand for any length of time within the stop signal limits of the interlocking.

19. When there is switching to be done at an interlocking, the train men must in no case cut their train before stopping, but must bring the train intact to a stop outside of the stop signal.

#### Exports of Electrical Machinery.

There has during the last two years been a marked increase in the exports of electrical supplies from this country. The increase has been particularly noticeable in the direction of the various apparatus that go to make up an electric railroad equipment. It is, indeed, no exaggeration to say that the American manufacturer to-day stands unchallenged in the first place as far as railroad plants are concerned.

Thus far the electric railway exports have been largely to the United Kingdom and Continental Europe, Buenos Ayres being the only South American city in which an electric railway is in actual operation, though plants are proposed in Caracas, Lima and Valparaiso. The high cost of coal is one of the chief obstacles to the building of electric railways in South America, and to those countries the exports are at present largely appliances for transmission of power from the water courses.

Custom House statistics fail to give any adequate idea of the value of the export trade, owing largely to defective classification. For the seven months ending with July the value of the exports reached a total of \$2,043,802, representing an increase of \$480,909 over the corresponding period of last year.

Among the American electrical manufacturing companies the most aggressive in the direction of bidding on foreign contracts seems to be the General Electric Company. This concern has agents in all the large European centers and employs an extensive system of travelers. Its European business is managed by its London branch house, which is officially known as the British Thompson-Houston Company. The President of the General Electric Company is now in London endeavoring to secure contracts. Among the recent large contracts the company has made are four, which involve a total amount of about \$750,000, although much higher figures of the amount have recently been published. These contracts include complete equipment for the Central London Underground Railroad and the Dublin tramways, and the electrical equipment for the Barcelona and Madrid tramways.

In connection with the New Central Underground Railway is another contract that has been awarded to an American company. The Sprague Electric Motor Company has secured the contract for putting in all the elevators (49 in number). The competition for this work was sharp, but it is stated that the railway people accepted the American bid almost at the same figures as those of foreign competitors because of superiority of workmanship.

Another large British contract to an American concern is that recently awarded to the European company of the Westinghouse Electric and Manufacturing Company by the Metropolitan Electrical Supply Company for a large electric lighting plant to be installed in London. The apparatus will be of the multiphase type, involving the use of the Tesla patents, which are owned in England by the Westinghouse Company. It is understood that the contract amounts to between \$350,000 and \$400,000.

The Walker Company has lately secured through its Paris representatives the contract for supplying the machinery and building street railways at Liegnitz, Silesia and Fiume, Austria. At the local office of this company they say that the export field in the electrical line is encouraging, particularly with Europe and the continent.

Aside from the increased exports of electric supplies there has been a corresponding increase in the export demand for boilers and steam engines to operate them. The E. P. Allis Company, for instance, during the month of September closed contracts for foreign orders aggregating \$500,000, a very considerable part of which represented orders in connection with electrical machinery. Six engines of 1,500 H. P. each were ordered for the Central London Underground Railway. Six were ordered for the Dublin tramways to furnish 1,000 H. P. each to propel electric cars over the old tramways. Three engines of 1,000 H. P. were ordered by the Barcelona authorities to work electric cars on their tramways. Two duplicate engines will be sent to Madrid, Spain, for the tramways there. From Sydney, New South Wales, has come an order for four engines of 1,500 H. P. each for the Sydney tramways. Another firm, McIntosh, Seymour & Co., have booked orders for upward of \$100,000. These contracts, they say, are for engines for Japan, Australia, South Africa, the Argentine Republic and Mexico, all for use in connection with electrical machinery.—*Journal of Commerce*.



ESTABLISHED IN APRIL, 1866.  
Published Every Friday,  
At 32 Park Place, New York.

#### EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The American Railway Association has added another chapter to the Standard Code, one on interlocking switches and signals, and we reprint it on another page. These new rules appear to have been the subject of very careful work on the part of the committee, and as a whole they constitute, probably, as satisfactory a chapter as any in the code; but we are surprised to find, in the very first "requisite for installation" a higher standard than is in force on any railroad in the world, a somewhat curious thing to come from an association which is noted for its conservatism. This requisite is that signals must be so interlocked that they cannot be pulled to the go-ahead position unless the track controlled by the signal is clear. This must mean electric locking, controlled by rail circuits; that is the only means that has ever been used for any considerable length of track to insure by mechanical apparatus that a signal shall not be cleared when there is a train standing on the track over which it gives the right to another train to travel. We congratulate the Association on setting for itself such a high standard, but the rule seems pretty radical, when we consider that, in the same code, distant signals, needed by the score or hundred on nearly every large road, are not even recommended; they are described as adjuncts, which may be used if desired. The eighth requisite may be criticised as neglecting to recognize the difference between a distant and a caution signal, a difference which was admirably set forth on the second page of the *Railroad Gazette* last week; but when we come to the fourteenth we find a principle which all the signal engineers that we know of declare to be positively vicious, that of locking a signal in the clear position. A clear distant may well be so arranged that a train passing it can lock its own switches, and all the signals and other fixtures designed to keep other trains out of its way, but its own home signal is not one of these. That should always be at the service of the signalman, to use for stopping a train in an emergency. The best rule in the code—that is, the one most needed in the railroad companies' individual codes now in force—is No. 825, forbidding the use of hand signals where fixed signals are provided. We give on the page next to that containing the Standard rules the Interlocking rules recently prepared by a committee of the Railway Signaling Club and approved by the Club. Readers will find interest in comparing the two codes.

Although of very exceptional importance, a decision just rendered by the Supreme Court of Connecticut on the question of the public necessity and convenience of projected street railroads has attracted little attention either in that state or outside of it. Several months ago in the lower court Judge G. W. Wheeler denied the public necessity and convenience of a chartered line of the Shelton Street Railroad Company which, if built, would have connected the cities of Ansonia and Derby with Bridgeport, and paralleled the Naugatuck division of the "Consolidated." In his finding Judge Wheeler laid down a legal dictum entirely novel in Connecticut cases of

the kind. He analyzed carefully the fiscal character of the enterprise, showed its financial weakness, and on that ground, mainly, refused to authorize it. His views were as follows:

If it should appear that the applicant is bankrupt, and that the road will exist on paper, that its promoters were but speculators intending to hawk the franchise about the state, no public interest could be conserves by such a road, and I don't think that the public convenience and necessity would require such a road. Under the statute the intention to build such a road must be proven.

In the argument on appeal counsel for the Shelton Street Railroad Company attacked vigorously the foregoing principle as asserted by Judge Wheeler, but the Supreme Court of the state now sustains it, and, as it appears, quite unqualifiedly. The higher tribunal declares that there is no error, that the legal inquiry as to the public necessity and conveyance of a street railroad involves not merely the question of public need of railroad service but of adequate or, at least, appropriate means to supply it, and that the evidence as to the financial decrepitude of the particular enterprise justified fully the conclusion of the lower court. The decision, in brief, means that the lower Connecticut courts in testing the public necessity and convenience of street railroads not only can, but must, consider—and with large latitude for interpretation—the financial status of each "parallel" enterprise, and it is likely to be a deadly blow to many of the "wind and water" trolley schemes in the state. Those schemes on paper now represent a mileage nearly or quite as large as that of operating trolleys, the large part of the projected mileage paralleling steam roads and, therefore, coming under the rule of the Supreme Court. The last report of the Railroad Commission of the state showed that of the stock (\$8,221,740) of operating trolley companies in the state only \$2,671,240 had been paid in as cash. Evidently it was fortunate for some of these highly dropsical corporations that the Supreme Court decision was not handed down earlier.

#### The Railroads of New South Wales.

The annual report of the Railway Commissioners of New South Wales to June 30, 1897, which is just received, shows continued prosperity of the railroads and tramways of that colony. The railroads open for traffic at that date were 2,639.5 miles; the average miles worked were 2,575, an increase of 108 miles open and of 44 miles worked, over the year before. This mileage had cost £37,369,205, or £14,157 per mile; or, say, \$69,000. The total debt per mile of the railroads of the United States, which is as near as we can get at the cost (but it is perhaps not very near), is about \$63,200.

The gross earnings of the New South Wales railroads for the year were £3,014,742; the working expenses were £1,601,218, or 53.11 per cent., and the net profit was £1,413,524. The average rate of interest on the colonial debt is 3.69 per cent., and the net earnings were enough to pay interest on the cost of the railroads at this rate and leave £33,479. Compared with the year before the gross revenue gained £194,325 and the net £144,995.

We have often spoken of the progress of the colonial railroads since the late Mr. Eddy and his colleagues took hold of them in 1888. The miles have increased from 2,114 to 2,639 $\frac{1}{2}$  and the gross earnings per mile have risen from \$5,469 to \$5,703 and the net from \$1,821 to \$2,674. The ratio of working expenses to gross earnings has fallen from 66.69 per cent to 53.11. It must not be supposed that this ratio has fallen because rates have risen. On the contrary, the rates have fallen on all items and seriously on many. We shall not stop now to look up the rates of 1888, but the report before us gives them for 1888, 1891 and 1896. They were in pence per ton-mile.

	1888.	1891.	1896.
Coal.....	0.81	0.76	0.63
Grain and flour.....	0.82	0.66	0.58
Hay, etc.....	1.04	0.46	0.40
Wool.....	2.23	2.49	2.35
Live stock.....	2.75	1.85	1.71
General merchandise.....	2.45	2.10	2.12

While rates have fallen the ratio of working expenses has also declined from causes familiar to the readers of the *Railroad Gazette*—grades have been cut down, permanent way has been improved, bigger engines have been put in service, and economy and efficiency have been developed all through the working staff, and these things have been done by resolute effort, in the face of much "politics."

We shall compare the ratio of operating expenses and the earnings per mile with our own, but it must be carefully kept in mind that our average rate is only 1.15 cents per ton per mile, while the New South Wales rate for general merchandise (all not included in the other groups) is 4.24 cents and the rates for wool and live stock, much the greatest sources of revenue, are 4.70 and 3.43 cents respectively. Having these figures in mind it is interesting to see that

our earnings per mile of road were in 1896, \$6,223 gross and \$1,837 net, and the ratio of working expenses about 67 $\frac{1}{2}$  per cent., while those of the New South Wales railroads were \$5,703 gross and \$2,674 net, and the ratio of working expenses 53.1 per cent.

An interesting fact recorded in this report is the addition of about 108 miles of light railroad, called "pioneer lines," during the year. These have been built with the object of giving railroad communication over level country into districts where the traffic would not warrant the expenditure for thoroughly equipped standard railroads. These lines are of standard gage and carry the ordinary rolling stock, hauled by a light class of engines, at a speed of from 15 to 20 miles an hour. They have cost on the average \$10,000 a mile, which is a reduction of \$8,000 a mile from the cheapest light railroad line heretofore built in the colony. Over 50 miles of railroad of the same class is now building and some 43 miles more will soon be begun.

The Commissioners have felt bound to help the farmers and graziers in the districts which have suffered from severe droughts by reducing rates and so-called "starving stock rates" have been put in, to have effect during certain periods. These are 50 per cent. below the ordinary live stock rates and are intended to make possible the removal of live stock to regions where it could get pasture and water.

In the colony there were in service during the year 62 $\frac{1}{2}$  miles of tramway. These have earned a good profit of about £58,000, after paying pretty heavy working expenses, namely, 81.15 per cent. of the gross receipts. The gross earnings per mile open amounted to £4,987. So far as we can learn from the report only about 5 miles of all of this tramway mileage is cable road and about 3 $\frac{1}{2}$  miles is electric.

#### English Railroad Accidents in 1896.

The British Board of Trade Return of Railroad Accidents for the year 1896, which came out last June, has now been supplemented by the "General Report" made by Mr. Secretary Hopwood, summarizing the facts contained in the full report. Five passengers, three employees and no "other persons" were killed in train accidents on the railroads of Great Britain during the calendar year, and 388 passengers, 153 employees and eight other persons were injured; as compared with four passengers, 12 employees and one other person killed and 390 passengers, 88 employees and no "other persons" injured in the year 1895. Only one passenger in 196,067,935 was killed in train accidents in 1896, and this proportion is made without taking into account the season ticket passengers, whose journeys aggregate many millions annually, and not one of whom was killed. In the larger table, containing casualties from all causes on railroad premises, the number of persons injured, 5,877, is more than a third larger than the number reported in 1895, which fact is explained by the more stringent regulations issued by the Board of Trade for reporting injuries to persons. Previous to 1896 the railroad companies used their own judgment as to omitting cases which were regarded as unimportant.

In general, the record before us shows no marked differences from those of previous years, and the comments of Secretary Hopwood call for little comment. A committee of the Board of Trade is still at work on tests of steel rails which were begun in consequence of the disastrous derailment at St. Neots in 1895, resulting from the breaking of a rail. A committee is also at work on the question of communication between passengers and employees on passenger trains (electric bells). The Board, by its sub-inspectors, has made over 300 inquiries into the causes of deaths or injuries to employees not connected with train accidents, and as a result of recommendations made by the Board many freight yards are now better lighted at night, signal wires and rods are better covered and other dangerous obstructions have been removed.

A dozen pages of Secretary Hopwood's report are taken up with summaries of the recommendations of the inspecting officers of the Board, in cases of train accidents investigated by them. These are sprinkled with numerous points of interest to American operating officers. For instance, an engineman who might have prevented a collision, or at least greatly mitigated it, by obeying the rule to promptly reduce speed on finding a distant signal against him, was excused on the ground that "this rule is notoriously a dead letter, distant signals being looked upon as mere indicators of the position of the home signal." English railroads, or American, which continue this rule, must have their satisfaction in it somewhat impaired when they consider such an official condemnation as this.

In an accident at Dukinfield and Ashton it appeared

that the white headlight on engines displays red to the rear, and that under certain conditions this red light is visible to signalmen in the cabins, thus making possible a mistake in noting tail lights; and the inspector takes occasion to condemn the carrying on engines of any light which may possibly be misleading. There are many places where this recommendation is needed in America.

At Dewsbury there was an accident to a train, the engine of which was running tender first, and although it was a "shuttle" train the inspector reminded the road that running tenders in front was contrary to the recommendations of the Board of Trade. Where engines are run without turning, the Board desires to have tank engines used.

At Hartlepool a passenger train entered a station too fast and the engineman testified that the trouble was due to the neglect of the guard and himself to see that the air-brakes were properly coupled up and the cocks open; but the inspecting officer held that this story was not true; he thought that the brakes had been properly connected and that the collision was due simply to careless running; in other words he charged the runner with all of the blame instead of only half of it.

At a junction near Crewe a passenger train grazed the caboose of a freight which did not quite clear the passenger's road, in consequence of the failure of a detector bar. This accident occurred on a dark night, and the signalman, in clearing the signal for the passenger train, depended on the detector bar, at the junction, to assure him when the freight had cleared the passenger train's track; but this bar was worked by wire, and in consequence of the stretching of the wire, or of lost motion somewhere, the lever was readily pulled clear without lifting the bar. Moreover, the inspector, Colonel Yorke, found it possible to latch the lever without moving the bar two weeks afterward, when he went to the place to make his inquiry. Wire-worked detector bars were found in general use on the London & Northwestern, and, of course, the inspector told the signal superintendent that rod connections, such as those adopted by most other companies, "were much to be preferred."

On the North British Railway a passenger train ran into an empty engine at a station in consequence of the empty engine having run upon the main line, after the signal was cleared for the passenger, the engineman mistaking a signal. But, though blaming the engineman, the inspector said that the collision was the natural outcome of an injudicious use of the "section clear but station blocked" signal. As is well known, the Board of Trade does not approve sending a train from A to B when there is a train standing at B, except under this modified signal, even though the standing train be protected by both a home and a distant signal. To allow trains on the main track at a station, when an incoming train from another station has nothing but a home and a distant signal to keep it from entering the station, is a practice which "in the interests of public safety cannot be too soon abandoned." That is to say, the "section clear but station blocked" signal, which pretty nearly represents everyday practice in the United States, is looked upon by the Board of Trade as dangerous.

At Burntisland on Dec. 9 a passenger train ran into a freight, near a home signal, under circumstances showing that very loose practice prevailed. The freight had passed the home signal, and then had been moved backward over 500 yards, and it appeared that such movements as this were common. Here again the use of the "section clear but station blocked" signal was held to be "far too prevalent."

At Surrey Canal Junction there was a collision due to failure of block working, and the inspector was unable to tell which of two signalmen made "a willful misstatement." The inspector observed that these mistakes are extraordinarily few considering the enormous number of trains dealt with, but considering the crowded state of this line he "recommended the company to consider the desirability of adopting lock and block working" which is an effectual safeguard against any accident being caused by a mistake like this."

At Preston Junction the engineman of a passenger train started his engine without looking at the semaphore, and after running a very few yards fouled another track and collided with a passenger train, causing the death of one passenger. Before starting, the engine stood almost immediately under the signal, and the head guard had given an all-right signal; and it is recommended that guards shall not give an all right signal in such a case without first knowing the position of the semaphore. It appeared, however, in this case that the signal arms for two separate passenger tracks were on the same post.

At Melton Constable, on Dec. 5, a passenger train entering a station ran into an empty engine standing on the main track, the signalman (forgetting that the engine was there) having wrongfully cleared the signal for the passenger train. The inspector says that "it is not at all a desirable thing to leave engines standing for 20 minutes on the main track." Side tracks should be made for engines in such cases, or, if that is out of the question, detector bars should be provided for the track at places where engines must stand.

On the Great Northern of Scotland, on the night of July 29, a gravel train was considerably damaged by running over a misplaced switch, and it appeared that it was the custom on this road to suspend the regular mode of working, and the use of fixed signals, during

the night, no ordinary trains being then on the road. The inspector "strongly urged" the company to detail men to carry on the proper working of the lines by signals throughout the night, when ballast trains were at work.

#### The Enforcement of the Federal Coupler Law.

From the first of next January all the railroads of the country must have their freight cars equipped with automatic couplers, and enough cars must be equipped with train brakes to permit the speed to be controlled by the engineman, unless the Interstate Commerce Commission grants relief; and as 1898 draws near many companies are sending petitions to the Commission for the extension of the time within which they may equip their cars. As many roads have, in consequence of the depression in business during the past three years, found it hard to equip cars as rapidly as was desirable, it is likely that the Commission will be disposed to grant some extension, though the members have not yet given any expression of opinion on the matter. A hearing will be given at Washington, Dec. 1, at which the railroads, the public and the employees will be heard.

The notice issued by the Commission requires all petitions for extension of time to be filed by Nov. 15, and each petitioner must present a statement of the condition of its freight cars on Dec. 1, at the same time stating how many cars have been equipped each year since March 2, 1893, and what new freight cars have been built or bought which were not equipped with automatic couplers and power brakes. Each petitioner must publish in a local newspaper and in its principal stations the fact that an extension has been applied for, and that the hearing of Dec. 1 is to be given. The Commissioners do not intend to make a perfunctory extension of the time for all railroads, without regard to the degree of justification there may be for the lack of complete equipment. They propose to consider each case separately and may extend the time for one road and refuse to extend it as to another.

The Commission has received statistics from some of the railroads, showing the percentages of freight cars that have been equipped according to law (including cars which, it is expected, will be equipped within the next two and a half months), and from these reports we extract the following:

Freight cars owned Sep. 1, 1897.	Percentage to be equipped by Jan. 1, 1898.		Per cent.
	With automatic couplers.	With train brakes.	
Boston & Albany	5,959	101	60
Boston & Maine	10,204	53	40.5
Fitchburg	5,158	76.35	56.3
Maine Central	3,288	33.33	33.33
New England	3,187	41	31
Baltimore & Ohio	33,234	89	80
Buffalo, R. & P.	6,517	67	23
Central of New Jersey	10,928	78	20
Del. & Hudson Can. L.	11,062	64	12
Del., Lack. & Western	26,696	1-0	50
Erie	40,388	74	30
Lehigh Valley	25,223	70	34
N. Y. C. & H. R.	38,897	100	55
N. Y., Ontario & W.	6,373	103	19
Northern Central	9,910	40	21
Pennsylvania	61,275	58	48
Phila. & Reading	25,100	91	20.5
Chi., Ind. & Louisville	5,208	32	32
Cin., Hamilton & D.	7,310	25	6
Columbus, H. V. & T.	7,561	62.86	31.72
Lake Shore & M. S.	18,910	101	15
Mich. Central	13,381	89	37
Penn. W. of Pittsburgh	52,453	67.9	37.7
Atlantic Coast Line	4,877	91	19
Chesapeake & Ohio	13,927	51.6	42.6
Norfolk & Western	16,033	11	14
Southern	19,545	80.27	47.5
Louisville & Nashville	19,189	16.5	12.2
Chicago & Alton	6,599	37.9	17.5
Chi. & Northwestern	35,017	94.28	67.25
Chi., Bur. & Quincy	22,443	65.77	43.33
Chi., Mil. & St. Paul	27,615	76.1	51.3
Chi., R. I. & P.	16,388	68	42
Wabash	12,330	40	18.33
Great Northern	12,161	75	75
A. chison, T. & S. F.	24,772	50	92.5
Missouri Pacific	11,749	43.8	10.4
St. Louis, I. M. & S.	8,878	32.2	3.1
Missouri, K. & T.	8,814	58	61
Southern Pacific	11,634	69	96

In connection with these statistics the Secretary of the Commission will make a table showing the financial condition of the roads which have not fully equipped their cars, some of the petitioners for an extension of time being companies that are paying good dividends. On the other hand, some poor roads have striven to comply with the law. Evidently the Commissioners will inquire closely in each case into the reasons why cars have not been more rapidly equipped. A well-informed Washington correspondent, who seems to know the temper and attitude of the Commissioners, says that extensions of time "will be difficult to obtain where a low percentage of cars equipped appears in the statement of a road financially strong." He wonders why it is that the Southern Pacific, which has not been paying dividends, reports 69 per cent. of its cars equipped with automatic couplers and 96 with train brakes; and the Baltimore & Ohio 80 per cent. of perfected equipment under both heads, while the Chicago & Alton, whose petition is made the basis of the proposed hearing, is not paying dividends of eight per cent. and yet reports less than 33 per cent. of its 6,599 cars equipped with safety couplers and only 17½ per cent. with train brakes. Continuing, he says:

"Section eight of the act gives the employee an important legal remedy against the road in case of injury when a locomotive or car is in use contrary to the provisions of the law. This remedy consists in relieving him

of the risk which he is held to assume under the common law and would give him the same right to recover damages as an outsider. The Commission will hesitate to take away this remedy from the employee in cases where the road has palpably neglected, in spite of financial strength, to comply with the law. There is a penalty of \$100 for each violation of the law. The Commission might not collect this in full, but the mere refusal to extend the time for equipment will place the railroads in an awkward position in case of damage suits by employees. Where any considerable number of new cars have been built without the required improvements the roads are likely to be called sharply to account by the Commissioners.

"The reports already received afford some interesting data regarding the leading roads, but the figures given are more favorable than would be shown by the reports from all the railroads of the country. Several large roads have not reported. No return has yet been received from the New York, New Haven & Hartford. The Boston & Maine, although paying liberal dividends for the past five years, makes a less favorable showing than the poorer Fitchburg. An uncomfortable surprise may await some of the roads which have relied upon the indolence and indifference of their associates to secure a general extension of the time for completing the safety equipment."

#### Annual Reports.

*Northern Pacific.*—This great property, which has seen so many vicissitudes, passed from the control of the Receivers in September, 1896, and the report now at hand is for the period to June 30, last, covering the operations of the first 10 months of the new company's history. It is a very satisfactory document, and contains a pleasing record of improvement and progress, and proves the conservatism of the recent reorganization. Nearly \$500,000 was earned above the amount required for interest payments in the period for which the 1897 report is made. This was the result in a year which was by no means a favorable one for the railroads of the country, and when large amounts were spent for extraordinary improvements, and with expenses further swelled by unseasonable weather. Autumn freshets caused much damage in Washington; the winter snows were the most severe experienced in the company's history and interrupted traffic on the lines in Minnesota, North Dakota and Montana. The spring freshets also caused much damage. In view of all this the income account given below makes a creditable showing. The length of road worked on June 30, 1897, was 4,375 miles, of which 2,347 miles was main line.

Earnings:	74.3	\$11,085,883
Freight	19.1	2,850,399
Passenger	6.6	1,003,536
Mail, express and miscellaneous		100
		\$11,911,818
Operating expenses:		
Maintenance of way and structures	29.6	\$2,711,213
Maintenance of equipment	14.1	1,287,917
Conducting transportation	51.5	4,626,910
General expenses	5.8	529,127
Total (81.28 per cent. of earnings)		9,155,872
Leaving net earnings (38.72 per cent. of gross)		\$5,785,9.6
From which deduct taxes (2.87 per cent. of earnings)		428,931
Net operating income (35.85 per cent. of earnings)		\$5,356,965
To which add dividends and interest on securities owned		215,340
Total net revenue		\$5,612,305
Against which has been charged:		
Interest on bonds		\$5,110,248
Losses and accounts written off		12,228
		\$5,122,176
Leaving a surplus to credit of Income Account June 30, 1897, of		\$189,8.8

Since the fiscal year closed the company has been reporting large gains in earnings over 1896. It is pointed out in the report that about the middle of July, when the condition of the crops in the Northwest justified confident expectation of an abundant harvest, the earnings of the company began to show a comparative increase that has continued with important gains, since the wheat movement began, about Sept. 1. The company's September gross earnings were \$221,000 above the 1896 total, showing an increase of 34 per cent., a larger ratio of gain than any other company so far reporting earnings for that month.

A good deal was done by the Receivers in improving the property, and that work was continued by the new company. Its expenditures last year out of expenses were liberal; maintenance of way charges were at the rate of \$724 a mile. There has been a material improvement in the condition of the roadbed and the equipment, and the increased efficiency of the property is evidenced in the statistics which are presented.

Confining ourselves for the moment to the charges against earnings, it is interesting to note that the largest item in the maintenance of way account (next to repairs of roadbed and track, \$1,335,726 which, of course, is mostly labor), is the \$452,067 spent in bridges and culverts. For crossties \$321,084 was spent and for rails \$111,341, these amounts being exclusive of the charges against capital. Removing snow and ice cost \$240,000 and for snow fences and snow sheds a further sum of \$43,000 was spent. Over 10 per cent. of the total expenses of the maintenance of way account was in these two items. The equipment account shows expenditures of \$41,000 for machinery, \$27,000 for air-brakes for cars and \$18,500 for engine brakes. During the year, 26 specially designed engines (which have been illustrated in these

columns) were put in service, being intended for use on those divisions where it was impracticable to reduce the controlling grades without undue expense. Seven engines have been changed from simple expansion to compound, and the statement of equipment shows that the company owns 14 compound engines. Besides filling vacant numbers in freight car equipment with 70,000 lb. cars, 200 box cars of this capacity were contracted for to be delivered in September, 1897. The company has 78 per cent. of its freight cars equipped with automatic couplers, but there are still 4,069 cars to be equipped with air-brakes.

The record of improvements is a long and important one, and in continuation of the policy of reducing grades revising alignment, filling in trestles, replacing wooden with iron and masonry bridges, ballasting, laying heavier rails, etc., over 105 miles of 72-lb. rails were put in the track, 112 miles ballasted and banks widened, nearly 1½ million crossties put down, 51,700 cars of earth used in filling trestles and 95,000 cars of material used in ballasting. Twenty-four miles of new side tracks were built. The permanent relining of the Bezemar tunnel will be completed this year. During the past year 7,200 ft. of side wall, 1,360 ft. of brick arch and 935 ft. of concrete arch have been built in this tunnel, and a good deal of work of a similar nature was done in other tunnels.

Timber structures have been disposed of as follows:

Replaced by embankment .....	305 bri'ges,	49,615.5 lin. ft.
Replaced by plate girders.....	13 "	2,841.9 "
Replaced by steel trusses.....	5 "	2,177 "
Total.....	323 "	54,637.4 " or 10.35 miles.

Contracts have been made for building 19 steel structures, to replace timber, the aggregate weight of material being 3,925,600 lbs. All this work will be in place by the close of the present season. During the past year the work of filling Cascade Mountain trestles by sluicing was pushed forward whenever the water supply would allow. About 320,000 cu. yds. was deposited in wooden bridges, at an average cost of 4.7 cents per cubic yard. To this should be added the cost of sluicing of bridge No. 191, where it was necessary to pump the water, raising the cost at that point to 13.5 cents per cubic yard. Mr. Winter, who signs the President's report, points out that it was not until 1890 that the work began of systematic filling and replacing of timber bridges by embankments and permanent structures of masonry or steel. On June 30 last 9,704 bridges of all classes, with an aggregate length of 92.10 miles, as compared with an aggregate length of 102.63 miles in 1896 and 143.98 miles 1890. Bridges in existence at the end of the fiscal year include 2,309 steel, iron and stone structures, with an aggregate length of 24,444 lin. ft., and 7,355 Howe and combination truss structures and pile bridges, with an aggregate length of 461,397 ft. The permanent structures referred to include steel truss spans and viaducts, iron culvert pipes and masonry bridges and culverts, which accounts for the small average length indicated.

One important point in which the economy resulting from the expenditures for improvements is made evident is in the average train and car loads and the train mile earnings. In 1897 the average train load of revenue freight was 182 tons. In 1894 it was 173 tons. Including construction freight, the average train load was 230 tons.

The reorganization plan turned over to the new company a fund of \$5,000,000 made up, \$3,674,913 of cash, and \$2,210,000 of prior lien bonds valued at 60 per cent., and representing \$1,325,000 of the fund. Of this, \$1,051,000 has been expended; \$819,000 for track and buildings and, \$232,000 for equipment. Besides this fund the company can use 1½ millions of prior lien bonds annually for betterments, and \$4,000,000 general lien bonds are reserved for the same purpose.

The company has treasury assets valued at \$3,702,000, of which the market value, Sept. 1, was \$5,348,000. The cash on hand amounts to \$2,000,000, and materials and supplies to \$1,318,000. The balance sheet shows further current liabilities of \$3,880,000 and contingent liabilities of \$604,000, but the total of current assets is \$8,514,8.8, an excess of \$4,030,000 over current and contingent charges.

A year ago there was a conference held at the Russian Ministry of Railroads, in which representatives of the railroads, of agriculture, of the grain trade and of the flouring mills took part. The result of their deliberations was that they favored a reduction of rates on grain exported; a reduction on inland rates for short distances and an increase for greater ones; rates for flour higher than for grain; a reduction of the railroad terminal and other charges, aside from transportation pure and simple. The resolutions of the conference were submitted to the government "Rate Committee" for criticism. Its members could not agree. A minority found the proposals practicable, and, for the interests of agriculture indispensable; the majority could not accept a difference in rates on grain for export and home consumption, nor rates on flour different from those on grain. The Minister of Finance passed the matter on from the "Rate Committee" to the "Rate Council." But, despairing of a decision which would carry authority, he asked to submit the matter to a joint committee composed of representatives of his department and of the Imperial Department of Public Economy. The Minister recommended to the joint committee to leave the interior rates substantially unchanged; to reduce rates on exported grain, so as to make them about four cents per bushel less than the domestic rates for a distance of 665 miles, and to give the Rate Committee authority to

make rates on the more valuable flour higher than grain rates by not more than 10 per cent. The new rates were to be introduced only after the results of this year's harvest should become known, after due notice. In case the crop should be short (as it is) the reduction in export rates would be postponed.

There has been recently an unusual number of accidents, some of them serious, on the German railroads, and the Prussian railroads have had their share of them. In consequence, the Minister of Railroads has issued a circular in which he says that most of these accidents have been due to negligence in carrying out the regulations, and he instructs the several railroad administrations to impress anew on all officers and employees the necessity of the most exact and faithful observance of all rules intended to secure safety, "and to take care that only such men be employed in the operating service as not only know the regulations governing their several duties, but also understand and practice them." We italicize certain words in Minister Thielen's order, because we have ourselves so long and so frequently urged the importance of just these points. In response to this circular the Berlin directory has instructed all the chief inspecting officers to report all officers, employees and workmen who are lacking in the requisite care and conscientiousness in the operating service or whose manner of life seems to disqualify them for further duty in this service, to the end that they may be removed from such service or transferred to other duties more suitable to their capacity. This is a warning more serious than it would be in this country, for the regular employees on the German railroads cannot be discharged at will, but hold their places usually as permanently as officers in our army or navy.

The Swiss Federal Assembly has adopted the bill which the Council of the confederacy brought in some time ago, providing for the purchase of the principal Swiss railroads by the State. Such a thing is made possible by the charters of these roads, which, as a rule, provide that they may be bought after a certain number of years. The charters also fix the prices to be paid for the roads. Generally, this is equal to 25 times the average yearly earnings for the ten years previous to the notice of purchase. The price, however, in no case can be less than the capital cost of the road, less renewal and reserve funds. Some of the charters require several year's notice of purchase. The bill proposes the purchase of three of the roads on May 1, 1903, and the Gotthard Railroad on May 1, 1909. The Council holds the view that under the charters and laws the railroads can be bought without any further legislation, but it recommends that the resolution to purchase be embodied in a law which makes it subject to the popular vote, or the referendum. As the transfer of private roads to state control is a matter of such high economical and political importance, it is probable that a referendum will be demanded, whereby the matter can only be decided in agreement with the majority of the people.

#### The Belfast Gas Engine Plant.

At the last meeting of the Institution of Mechanical Engineers (British), Mr. Victor A. McCowan, Electrical Engineer of the Belfast Corporation, gave a description of the Belfast electric lighting plant which includes among its machinery six gas engines of three distinct types and aggregating 900 H. P. The experience gained from their use will be of considerable service to those who are watching closely the introduction of gas engines for driving dynamos. The tests show fairly good results, but Mr. Benj. T. O'Brien points out that from the reports of gas consumption, and from the prices as given in the paper, it appears an indicated horse power per hour would cost ½ (1½ cent) of a penny, while with coal at 10¢ a ton, 1 H. P. per hour could be obtained for ½ a penny by the steam engine.

The engines used at Belfast are made by Messrs. Dick, Kerr & Co., on the Hartley and Kerr type. The electricity is distributed by the three-wire, low-tension system, but reference will be made only to the results obtained from tests of the gas engines and of the experience gained from their use.

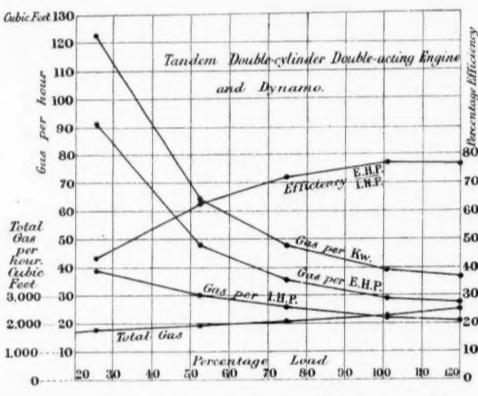
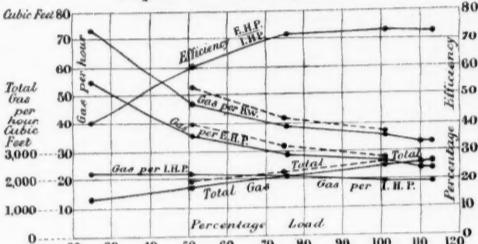
The machinery in the engine room includes four 120-H. P. tandem double-acting horizontal gas engines running at 180 revolutions a minute and driving four 57.6 K. W. dynamos at a speed of 600 revolutions; two 60-H. P. single cylinder double-acting horizontal gas engines running at 180 revolutions and driving two 26.4 K. W. dynamos at 750 revolutions a minute, and two 150-H. P. four-cylinder, single-acting, high-speed vertical gas engines running at 380 revolutions a minute. The last mentioned engines are direct coupled to two 72 K. W. dynamos, while the others drive the generators by means of cotton ropes. The upper diagram in the accompanying figure shows graphically the results of a test at the Belfast electric lighting station, where the calorific value of the gas used is found to be 570 B. T. U. per cubic foot at atmospheric pressure and 60 deg. Fahr. The lower diagram is taken from an engine at Glasgow, where a cubic foot of gas was found to contain 750 B. T. U. It will be noted that while the amount of gas per kilowatt and per estimated horse power are very much larger in the lower than in the upper diagram, the efficiency and the total number of cubic feet used per hour vary but little in the two cases, thus indicating that it would be unfair to compare the economy of the two engines by giving simply the gas per horse power or per kilowatt. Even greater differences might

have been expected considering the larger number of heat units in the gas at Glasgow.

The author makes the general remark that from the experience gained the gas engine station necessitates more attention than a steam-engine station. For the sake of efficiency, the machines in the Belfast station are run as near a full load as possible, and a machine can be started and the circuit closed in about two minutes. The total efficiency (or the ratio of units used to those generated) has been found to be about 91 per cent. This is equal to an average consumption of gas during the year of 34.8 cu. ft. per H. P. Of the 9 per cent. lost, 6.7 per cent. is charged to the loss in the storage battery of the private consumers; while but 2.3 per cent. is found to be lost in the mains.

In discussing this paper Mr. E. R. Dolby called attention to the results as given in the different tests, showing that the larger horizontal engine gave considerably better results than the smaller horizontal engine. He also stated that it would be a matter of considerable interest if it was known the amount of light that could be obtained from the gas in the ordinary burners and then the amount of candle power that could be obtained by using the same amount of gas in the engines that drives dynamos for electric lighting. In reply to this, Mr. McGowen stated that it had been found that one unit would supply 226 candle power for one hour in the electric light, which is equivalent to 4.95 candle power per foot of gas per hour. The same gas used in ordinary burners gave from 2½ to 3 candle

Four-cylinder Single-acting High-speed Vertical Engine coupled direct to Dynamo.



Dagrams Plotted from Gas Engine Tests

power per cubic foot of gas per hour. Another objection that had been met by one of the members was in regard to the difficulty arising from the annoyance to consumers in the vicinity where gas engines were used, due to the flickering of the gas jets connected with the same main as the engine. It was stated, however, that in Belfast no complaints had been made from this cause; neither was the vibration nor noise nor any of the troubles which had been met at other places present at the Belfast station. Regarding the economy of the different engines, it was stated that the high-speed vertical engines coupled direct to dynamos were somewhat cheaper than the horizontal engines driven by ropes; besides, there was a considerable advantage in the smaller floor space occupied by the former. As a result of the tests on the single cylinder, double acting engine, it was found that at a load of about 24 per cent. the total gas amounted to about 74 per cent. of what it was at high load of about 118 per cent., but that the same test showed an indicated horse power at low load of 41 per cent. less than at high load.

#### A Correspondence School of Locomotive Enginemen and Firemen.

At the recent meeting of the Traveling Engineers' Association at Chicago, a paper was read entitled "How Should a Locomotive be Operated to Secure the Most Economical Results?" In this paper it was recommended, among other things, that in order to obtain the best results especial attention should be given to the instruction of enginemen in the principles underlying the operations which they perform daily. The demand for this kind of work is shown by the rapid progress made by the Correspondence School of Locomotive Engineers and Firemen, 331-335 Dearborn street, Chicago, and the encouragement and help which higher railroad officials have given those in charge of the school.

This school was started June 9 last, and now the membership numbers a little over 2,800, being about

equally divided between enginemen and firemen: 37 railroads are represented, mostly in the central states and the northwest. The instruction is carried on by correspondence, a list of about ten questions being sent to each member each week. It is expected that the answers to these questions will be forwarded to the school for correction before the succeeding week, when the correct answers to the previous week's questions are sent out. At the end of each quarter about 40 questions are required to be answered as a review examination. At the end of a year, upon the completion of a course, a final examination is held, being conducted by a teacher of the school or some competent official of a railroad, upon which the standing of each member depends. A suitable certificate is given at the end of the year, showing the grade made in the final examination. Members are expected at any time to ask questions by mail, answers to which are given in the same way.

There are two regular courses of study, one adapted for firemen and one for enginemen, and both of which cover a wide range of subjects directly connected with locomotive operation.

There are two rooms at the school used as exhibit rooms, and it is the intention to make as complete a collection as possible of the latest special equipment for locomotives. At present the following manufacturers are represented by exhibits.

**Allen-Morrison, Chicago.**—Three soft composition brake-shoes in different stages of wear.

**American Brake Beam Co., Chicago.**—Full-size Kewanee tender brakebeam; Mackintosh engine truck box and cellar; Mackintosh engine truck oil cup.

**American Electric Forge Co., New York.**—Electric forge.

**Barney & Smith, Dayton, O.**—Full-size "Harrington" semaphore signal.

**Drexel Railway Lamp Works, New York.**—"Blizzard" signal lamps for locomotives for either electric or oil light.

**C. C. Jerome, Chicago.**—Sectional models showing the Jerome metallic packing as used with piston and valve rods and air pumps; also the Mackintosh blow-off cock.

**The Lunkenheimer Co., Cincinnati.**—Sectional model of full size injector and blue prints.

**J. H. Miller, Chicago.**—Engine truck oil cup and "Miller" lubricating pad.

**Nathan Mfg. Co., New York.**—Full-size locomotive lubricator, blue prints and sectional model of No. 6 Monitors injector, Heginbottom's bell ringer.

**One Injector Co., Wadsworth, O.**—Sectional model of full-size injector with blue prints.

**Pyle-National Electric Headlight Co., Chicago.**—Electric headlight apparatus completed in working order, the generator being driven by a motor manufactured by the Western Electric Co., Chicago.

**Schubab & Sercomb, Milwaukee, Wis.**—Small valve model.

**Wm. Sellers & Co., Philadelphia.**—Sectional model of full-size injector with blue prints.

**Stannard & White, Appleton, Wis.**—"Brotherhood" locomotive cab seat; folding bath tub.

**United States Lubricating Co., Chicago.**—Samples of oil cans.

**United States Metallic Packing Co., Pittsburgh.**—Sectional models of United States metallic packing as applied to piston and valve rods and air pumps; Golmar bell ringer; Dean sanding device.

**Westinghouse Air Brake Co., Pittsburgh.**—Full-size sectional models of the latest engineers' valve and quick-action triple valve.

The officers of the correspondence school are: President, Mr. Royal C. Vilas; General Superintendent, Mr. W. N. Mitchell; Secretary and Treasurer, Mr. R. A. Bagnell; Educational Director, Mr. J. F. Cosgrove.

#### The Jackson & Sharp "Duplex" Car.

The accompanying engravings show a new convertible summer and winter car, built on the patents of the Duplex Car Co., of Boston, and it is believed to have many points of merit which will be appreciated by both railroad officials and the traveling public. In many respects it is superior to those types of convertible cars where it is necessary to take out the sides and store them away, and to change the seats, curtains and other fixtures while the car is being used in mild weather. It will be seen from the cut showing the outside of the car that the glass and side panels can be raised and lowered and that when the car is open the sections are carried overhead and out of sight, but ever ready for service when sudden storms or cold weather make it

where sudden changes of weather often prove of serious consequence to the passengers. This type of car can be substantially built, if not even more securely, than the standard type car, as the posts are in one piece curved from sill to sill, so that the pieces connecting the roof to the body of the car are dispensed with. The first car of this type was used on a line in New Hampshire, where it was given a severe test in all kinds of weather, and the manager states that the earnings of this one car going over precisely the same route as the other cars were invariably greater than either the regular open cars run in the summer or the closed cars used in winter.

strength and total reduction of dead weight per car of malleable iron (that can justly bear that title) as against grey iron, we discover that the original investment begins to declare dividends to the purchaser very soon after castings are once applied to car or engine. This is further emphasized by the fact that when malleable iron castings are once applied they "stay where they are put," and are not removed on account of breakage within a very brief period after application.

It certainly costs time and money to cut out and switch cars from trains to shops or repair branches, and their condition as to breakage is not improved while being handled in a crippled condition. We know it is expensive to remove and renew castings on cars, especially when loaded, and particularly such items as body center plates, where it requires shifting of the load. Would it be impertinent to inquire how many tons of coal or ore have been shoveled in a year to get at center plate bolts? or how often you run up against a car of machinery or wooden ware, packed by experts, when, after shifting the load and replacing center plates, you find that the original load has "swollen" to such proportions that it takes two cars to carry it? I ask if a factor that will in any degree aid in the quick dispatch of freight is not worthy of consideration, and is it not reasonable to assume that cars originally equipped with malleable iron castings of proper strength and dimensions would aid largely in accomplishing a result that is certainly desirable to obtain?

I am permitted to quote from a very complete and carefully compiled record of a prominent trunk line of

The interior of the car is both attractive and roomy. The curved lines in the construction may impress some as being more artistic than the straight lines with angular points. The reversible seats are of the Hale & Kilburn "Walkover" type and covered with rattan. The widest point of the car is just at the shoulder height of the average size person, and thus gives more comfortable accommodation for two persons on each seat than in other styles of cars with the seats similarly arranged. For summer service it affords all the advantages of an open car, with better seats than are usually placed in such cars, and in the case of a sudden shower it can be readily closed. In a word it is a distinctive "all the year round" car, and when once mounted on its trucks requires no change in any of its fixtures. The cuts show a car of this type very recently built for the Bergen County Traction Co., Bergen County, New Jersey, upon whose lines it is now in satisfactory service. A sample car will be sent to the Niagara Convention, where it will be in service. The Jackson & Sharp Company, Wilmington, Del., has arranged to build the cars of this type.

#### Malleable Iron in Car Construction and Repairs.\*

First, and of greatest importance to railroad companies, is the economy of malleable iron as com-

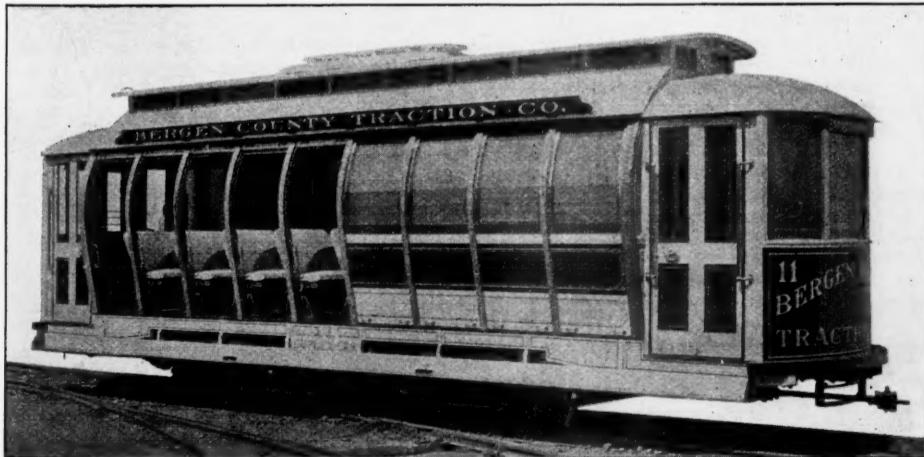
this country that has been using malleable iron in car and locomotive construction and repairs for a number of years, and is to-day using it almost exclusively on cars, as follows: "That for every dollar's worth of grey iron castings purchased for a stated period of years and used in car and locomotive construction and repairs, more than 50% cents of the same at original value have been removed on account of breakage from cars and engines and consigned to scrap pile, and during an equal period for every dollar's worth of malleable iron castings purchased and applied to cars and engines, less than 3% per cent. at its original value have been removed on account of breakage and consigned to the same locality."

It would be impossible for us to secure these facts and give this statement publicity without the aid and consent of a gentlemen well and favorably known to us all, not only for his mechanical ability, but by his vigorous work at the several railroad clubs and the National Association. In the introduction and use of malleable iron for car and engine construction and repairs he certainly is the pioneer, with results that must be quite as gratifying to him as they have been to his company in point of economy. I take great pleasure in referring to Mr. A. E. Mitchell, Superintendent of Motive Power of the Erie Railroad Company.

Now as to the question of dead weights: With a reduction of from 1,300 to 1,500 lbs. per car of 60,000 lbs. capacity (dependent upon design), as compared with grey iron castings, we readily see that an extra car might be easily added to each train of 15 cars without placing any additional tax upon the motive power. Or, assuming that a railroad company is deriving a revenue for carrying 20,000 lbs. of freight instead of deadheading an equal amount of grey iron castings, could not this revenue, in all fairness, be credited to the original cost of malleable iron castings as the producing cause? This does not occur once a year or once a month, but is in evidence on every trip of the train, thus adding strength to the argument we seek to advance and creating a revenue for the company from an apparently undiscovered source.

Again, if we take what statistics show it costs a railroad company per ton per mile to haul freight, and a car will average say 20 miles per day for a year and there is a reduction in dead weight of 1,300 to 1,500 lbs. per car on account of using malleable castings, a simple calculation with the foregoing figures as a basis will readily demonstrate that the company is deriving a yearly revenue equal to nearly one-half of the original cost of malleable castings used on car. Add to this a reduction in stock of castings necessary for a company to carry on account of less breakage of malleable iron as against grey iron castings, and we secure a sum total that would seem to recommend malleable iron castings for general use in car and locomotive construction and repairs.

Grey iron castings can at all times be readily replaced by those of malleable iron for the reason that the original outlines of patterns are maintained, the only change being a reduction in thickness of metal, and additional



The Jackson & Sharp Combined Summer and Winter Car

desirable to have the car closed. Furthermore, the change can be made in a few moments, and each passenger can raise or lower the sashes at will much the same as in passenger cars on steam railroads. The whole section between posts may be moved together or the sash alone as necessity requires. It may be surmised from what has just been said that this car is especially adapted for suburban or mountain lines

pared with grey iron castings for similar uses. This may seem a startling statement to make and appear not to be borne out by the prices rendered by malleable iron manufacturers against purchasers; but when we consider the reduced weight of from 40 to 60 per cent. per pattern, the greatly increased

\*Extracts from a paper by Mr. E. Chamoerlain, read at the September meeting of the Central Railway Club.

strength given by ribbing and building up in detail and consequent lessening of dead weights.

In the struggle for existence and recognition during the past and present depressed business period, many manufacturers of alleged malleable iron have by various methods reduced the price to a point that makes it im-

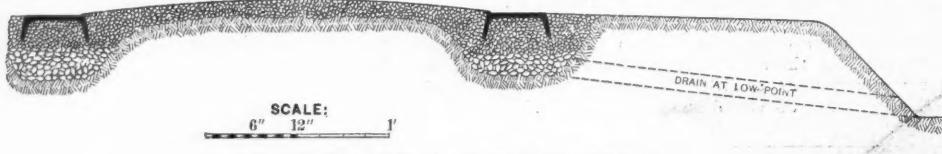


Fig. 1.—Wagon Road with Steel Wheel Tracks.

possible to produce at a profit malleable iron castings of required strength and utility. The remedy is in the hands of the railroad companies. A well-established test, as may be agreed upon, demanded from the manufacturers of malleable iron and made by inspectors designated by purchasers, that will show tensile, transverse, bending and torsional requirements of a nature which will give satisfactory evidence as to strength and quality, and such test pieces to be taken from the castings themselves, selected by railroad companies, and

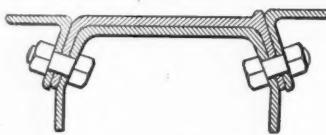


Fig. 2.—Section of Steel Track at Joint.

not from test bars prepared by manufacturers. Castings should also show, when broken, evidences of proper annealing, and be free from blow-holes.

It is my belief that the reputable manufacturer of malleable iron stands ready with a competent corps of draftsmen and patternmakers to embody the ideas of any Master Mechanic or Master Car Builder in a change of patterns from grey iron castings to those of malleable iron for use in locomotive and car construction and re-

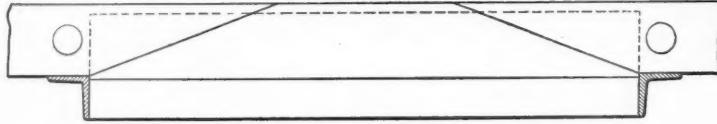


Fig. 3.—Side Elevation of Steel Track Joint.

pairs, and at the same time to offer, if desirable, a few valuable hints as to the power of distribution of metal to give greatest strength to the several patterns; also to submit free of expense, for your inspection, any and all malleable iron castings which they now manufacture and are in general use.

#### Wagon Roads with Steel Wheel Tracks.

For several years the Department of Agriculture has given special attention to the design of a cheap and efficient road for use in the farming districts, and in order to promote more extended experiments in this matter has recently established the office of Road Inquiry, with General Roy Stone, Director. In accordance with the desire of the Secretary of Agriculture, that more experiments be made in the use of steel trackways on wagon roads, this office lately made arrangements with the Cambria Iron Works, of Johnstown, Pa., to roll special rails for this purpose. After much discussion, the Director of Road Inquiry and the engineers of the Iron Company have agreed on a plan for a track which promises to meet the requirements.

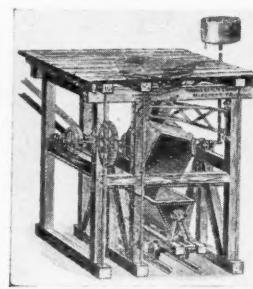
This track consists of two inverted steel troughs, as shown in Fig. 1. No crossties are used in the construction, but the rails rest directly on a bed of gravel and are tied together occasionally to prevent spreading. The inverted troughs, or channels, have a bearing, or tread, for the wheels 8 in. wide and about  $\frac{1}{2}$  in. thick, and there is a bead raised on the inside edge of the tread to guide the wheels, as will be seen by Fig. 2. They are fastened together at the ends by the device shown in Figs. 3 and 4. This consists of two fish plates, each of which has a flange, or shoulder, inclined at the ends on its outside. This flange is used in order to run the wheels on the rails again after passing a wagon. Turned up inside the channel there is also a plate at each joint as shown by Fig. 2. For the use of this cut, together with the others illustrating his description, we are indebted to the courtesy of the *Iron Age*.

The track weighs about 100 tons per mile of single track road, and will be furnished in small sections at the rate of \$3,500 a mile. Instructions for laying and assistance, where practicable, will be given by the Office of Road Inquiry.

The New York State Agricultural Experiment Station gave the first order for a section of this track to put in its sample road at Geneva. Experiments with metal track ways on earth roads have been made by several individuals, all with considerable success. The Office of Road Inquiry hopes, with the aid of the agricultural stations in the country, whose co-operation is being urged, to be able to have several miles of the track put down before the winter sets in.

#### An Improved Concrete Mixer.

The illustrations show an improved machine for mixing concrete. It consists of a cubical box made of steel plate. Trunnions are attached to diagonally opposite corners of this box, and these in turn are fastened to a shaft



which is operated by a double gearing. In former machines this shaft was of the ordinary solid form, but as now made it is of larger diameter and hollow, with numerous perforations within the box. A cap is provided for closing one end of the shaft, and the other is provided with a union connecting with the water supply. This consists of a tank made so that salt water may be used if desired. It is provided with a valve regulated to supply a stated amount of water to each batch being mixed, but it is so arranged that the batch can be mixed dry before applying the water.

For charging the mixture, a stationary hopper, lined with steel, is attached to a platform above the machine. This is sometimes supplied with a slide, so that the charge can be deposited and held while the machine mixes one previously put in. A swinging hopper, made to fit the angle which the mixer assumes when its door is open, is supplied to prevent spilling material and to facilitate operations. This hopper is so hung that it must be held in place by the operator while charging. A platform is provided for this man, who also attends to the friction-driving pulley which operates the machine.

The drawing represents a 4-ft. cube machine and shows one mode of serving the mixer. In connection with a belt driven friction drum power hoist, a derrick is placed at an angle above the mixer platform. A carriage containing any required number of sheaves runs on this derrick. The wire hoisting rope is led from the power hoist over a guide shaft and laced through the sheaves in the carriage and in a hoisting block and the end of the rope attached to the carriage. By this means the box or other receptacle for the material to be mixed is hoisted from the ground, the carriage bringing the load over to the mixer hopper. The machine may also be served by an elevator large enough to receive cars filled from storage bins, or by an ordinary boom derrick.

Oak boxes for serving the mixer are used in connection with this machine. These are well ironed, and so made that when tripped by the side trigger they will discharge their loads and relatch for another charge. "V"-shaped cars are also made for handling material.

Some years ago a plant of these machines was built for use in the erection of the breakwater in Lake Erie,

#### Long Locomotive Run for the Missouri Pacific.

The officers of the Missouri Pacific Railway are considering the question of running passenger locomotives through from St. Louis to Kansas City without change, this distance being 284 miles. The General Manager advises us that the road is not now in a position to undertake this change on account of the inequality in the weight of the various trains and the number of different types of engines now in passenger service. It is the belief, however, that all locomotive passenger runs on the Missouri Pacific can in time be extended with economical results.

In our issue of June 25 appeared an outline of what a number of important railroads are doing in the matter of running locomotives long distances, and reference to this article shows that the Cleveland, Cincinnati, Chicago & St. Louis is running engines successfully in both freight and passenger service 283 miles between Cleveland and Indianapolis.

To determine whether the contemplated extension on the Missouri Pacific was practicable a trial run was made Sept. 14 between St. Louis and Kansas City with a new engine, No. 263, recently built at the Missouri Pacific shops at St. Louis, hauling what is known as the westbound "Fast Mail" train. The engine made the trip successfully with the single exception of a hot engine truck box, on account of which it was necessary to stop after 250 miles of the run had been made; cooling the box caused a delay of about 30 minutes. From this point, in an effort to make up the time lost, a speed of 68 miles an hour was attained and held for a short distance, and about half the time lost was made up before reaching Kansas City.

The engine used on the trial trip is of the eight-wheel type and was designed to haul the fast mail train between Sedalia, Mo., and Kansas City, 90 miles, doubling the road each day. The train between these points is six cars and is scheduled for an average speed of 42 miles an hour. The engine formerly used in this service had 17 x 24-in. cylinders, and steam pressure of 160 lbs. per square inch, and was found to develop insufficient power to make the required time easily, especially on the hilly parts of the road where the maximum grades are 70 ft. to the mile. The new locomotive is more powerful, and has cylinders 18 x 24 in., a total weight in working order of 127,300 lbs., of which 81,000 lbs. is on the driving wheels. The driving wheels are 68 in. in diameter and

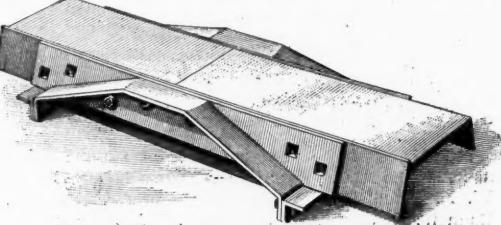
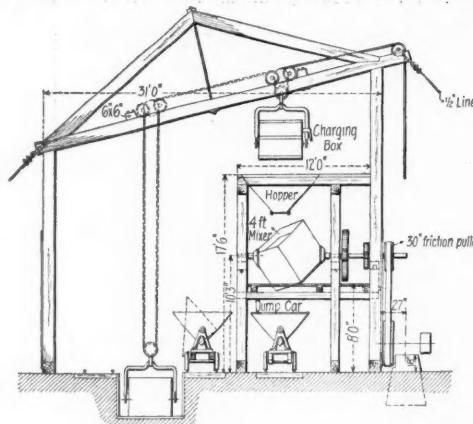


Fig. 4.—Joint Showing Device for Replacing Wheels.

the truck wheels 30 in. The driving wheel base is 9 ft., the total wheel base 24 ft. 2 1/4 in.; the total length of the engine is 34 ft. 5 1/8 in., and the total length over engine and tender is 59 ft. 8 1/8 in.

The boiler is of the extended wagon-top type with an outside diameter of barrel of 60 in. at the front end, and carries a working steam pressure of 200 lbs. per square inch. The engine has a deep firebox placed between the driving axles, which is 7 ft. 2 1/2 in. long. The heating surface of the tubes is 1,563.8 sq. ft., that of the firebox is 159.7 sq. ft., making a total heating surface of 1,723.5 sq. ft. The grate area is 20.34 sq. ft. There are 256 tubes 2 in. in diameter and 11 ft. 9 in. long. The tender loaded weighs 90,450 lbs. and has swivel trucks and 33-in. wheels.



Machine for Mixing Concrete

The tank is 20 ft. 3 1/2 in. long, 3 ft. 10 1/2 in. high and has a capacity for 4,000 gals. of water.

#### TECHNICAL.

##### Manufacturing and Business.

The Pantasote Co., with office and salesrooms at 29 Broadway, New York City, has succeeded Clarence Whitman & Co. as selling agents for Pantasote, a substitute for leather for car curtains, seats and headlinings. This change was made necessary on account of

at Buffalo. This plant consisted of two 4-ft. concrete mixers with a small double track cable road for handling dump cars which deposited the material under the trestle supporting the track. The cable plant consisted of a small engine and two grip cars, one for either track. The plant was so made that the cars could be propelled in either direction independent of each other. The mixers were placed at either end of the pier, which was about 1,500 ft. long, and was constructed in 20 ft. of water. These machines are built by Thomas Carlin's Sons, Allegheny, Pa.

rapidly increasing business. The company has recently booked some large orders from railroads in the United States, and the Wagner Palace Car Co. has adopted Pantasote as its standard material for car curtains. John M. High will be General Agent.

The Garlock Packing Co., of Palmyra, N. Y., is now making a full line of cut gaskets for boiler manholes and handholes, and for other uses. With patented automatic machinery gaskets are cut to any size and in a perfect ellipse, or circle, to the requirements of customers.

The Youngstown Bridge Co., of Youngstown, O., has let the contract for its new shop buildings to the Shiffler Bridge Works, of Pittsburgh, Pa. The main shop will be 80 x 500 ft., with two extensions of 100 x 26 ft. for unloading and loading material directly into and from the shops. The forge and machine shop, together with boiler house and dynamo room will be 60 x 180 ft. It is expected to equip the plant with electricity throughout. The new plant will be running in about 60 days.

The Pierce & Miller Engineering Co., Havemeyer Bldg., New York City, reports a marked increase along all its lines of business, following the return of its President, F. M. Pierce, from his tour around the world, during which he made many valuable connections. From observations he made while abroad he decided that America would do a large European business in furnishing equipment for electric tramways, and to accommodate this and the rapidly increasing home trade, an increase in this company's engineering and selling force has been drawn from England and Ireland. Mr. Pierce states that he has made strong financial connections in London and New York, whereby his company will be able to finance electric railroads and other enterprises. The company reports work in hand as follows: One 300, three 1,200, three 300 H. P., and several hundred H. P. in small engines, and one complete railroad power plant. The company is now handling the Rice-Sargent engine for large work, and the Standard Ball engine for the smaller, high and medium speed electric purposes.

H. F. J. Porter, General Sales Agent of the Bethlehem Iron Co., with headquarters at 1433 Marquette Building, Chicago, Ill., has, during the past six months, been at the works in South Bethlehem, Pa., during the absence in Europe of R. W. Davenport, Second Vice-President. Mr. Porter reports that there is a decided improvement in the steel forging business in the East, and that there are evidences that business will pick up rapidly in the West. He will have his headquarters at the works during the winter. His Western office will be in charge of his assistant, Erwin Nelson.

The American Railroad & Lumber Co. has been incorporated by Homer B. Parsons and E. M. West, of Brooklyn, N. Y., and Louis T. Haggin, of Creskill, N. J., to build, maintain and operate railroads. The capital stock is \$250,000 and the principal office will be at Jersey City, N. J.

The Pancoast Ventilator Co., Bourse Building, Philadelphia, Pa., reports an improvement in business. Among other recent orders is one for 14 large ventilators and bases for the roundhouse of the Baltimore & Ohio at Cumberland, Md., and a large number of copper ventilators from four to six feet in diameter for the new Astoria Hotel in New York City.

Owing to a typographical error in our last issue we gave the name of the new brakebeam company organized at Portland, Me., as the Oral instead of the Oval Brake Beam Co.

In connection with recent newspaper reports that the Pennsylvania Bolt & Nut Co., of Lebanon, Pa., had shipped 150 tons of bar iron to China, the company informs us that its principal shipments to China and Japan are of this material, and that large and frequent orders for bar iron which were formerly placed in England and Germany are now coming to this country.

Comstock, Cheney & Co., of Ivoryton, Conn., are erecting a fireproof building about 50 ft. long. The side walls are brick and the roof is of iron. The covering is corrugated iron lined with Anti-Condensation fireproof roof lining made by the Berlin Iron Bridge Co. of East Berlin, Conn. The same company is also furnishing and erecting all of the steel work of the roof.

The Chicago Pneumatic Tool Co., Monadnock Block, Chicago, Ill., has established offices in New York City, at 120 and 122 Liberty street.

The Davis & Egan Machine Tool Co., of Cincinnati, O., has sold through its Berlin office a number of lathes, shapers, drill presses and other machinery to the A. Borsig Co., of Germany. This is one of the largest locomotive works in Europe, employing over 8,000 men.

The Blake Steam Pump Works, Boston, Mass., has added the largest Eberhardt's automatic gear cutter ever built for cutting spur gearing of the coarsest pitches, 100 in. x 20 in. face, weighing about eight tons. Gears of many tons weight can be put into the machine and taken out without changing any adjustments, and will take larger diameter of cutters and coarser pitches than any machine ever built.

Charles Henry Davis, President and Consulting Engineer for the John Stephenson Car Works, now being built at Linden, N. J., has let the contract for structural steel work, amounting to 800 tons, to Milliken Bros., of New York City, who have sublet the roof trusses and columns to the Elmira Bridge Co., and the beams and other iron work to the Phoenix Iron

Works. The iron work is specified to be finished Nov. 1.

The Schmick Patent Car & Rail Joint Co., of Hamburg, Pa., has been incorporated to make and sell cars and rail joints patented by H. J. Schmick. The capital stock is given as \$1,000,000, commencing with \$382,000, and the incorporators are: M. L. Ritter, Reading, Pa.; John M. Kutz, Mahoney City, Pa., H. J. Schmick and Peter L. Diemer, Hamburg, and Frank Simon, Schuykill, Pa.

T. E. Ward & Co., of New York City, have been incorporated to make street railroad cars and deal in electrical machinery. The capital stock is \$5,000,000, commencing with \$1,000,000, and the incorporators are: T. E. Ward, N. F. Griffin, Charles O. Larender and E. D. Fleetham, of New York City, and E. W. Sadler, of East Orange, N. J.

At the annual meeting of the Michigan-Peninsular Car Co., at Chicago, Oct. 5, the following directors were re-elected: James McMillan, Hugh McMillan, W. C. McMillan, C. L. Freer, W. M. Freer, F. J. Hecker, G. R. Turnbull, H. B. Moorehead and R. H. Thompson. An abstract of the financial report for the year ended Aug. 31 was published in our last issue.

The Pennsylvania Railroad has bought 40,000 tons of rails at \$19 a ton for 30-ft. rails and \$20 a ton for 60-ft. rails, dividing the order among the Cambria Iron Co., Pennsylvania Steel Co. and Carnegie Steel Works. These rails are to be delivered before Jan. 1 next, and are to be used for double tracking the Atlantic City Division of the West Jersey & Sea Shore Railroad and replacing old and lighter mails on other parts of the system.

The Buffalo Terminal (controlled by the New York Central & Hudson River) has recently placed contracts for bridge work as follows: Elmira Bridge Co., 800 tons; Pennsylvania Steel Co., 800 tons and Buffalo Bridge & Iron Works, 400 tons. These contracts cover overhead crossings of streets and railroads in Buffalo, N. Y.

The Pencoyd Iron Works have been furnishing considerable steel work for docks for New York City, including recreation piers at the foot of East Twenty-fourth street, 700 ft. long and 50 ft. wide, weighing 900 tons, and at the foot of East Third street, 300 ft. long, and weighing 450 tons. Also for a pier at the foot of West Eleventh street, 400 tons; for the new morgue and pier at the foot of East Twenty-sixth street, 400 tons; pier at foot of Bank street and for the pier at the foot of Gansevoort street, 150 tons. The general contractors for the work were R. M. Hood & Co. for the two recreation piers, and Steers & Bensel, Post & McCord, Grattan & Jennings and P. Sanford Ross, respectively.

The Whiting Foundry Equipment Co., of Harvey, Ill., has received an order for a traveling crane of 6,000 lbs. capacity, with compressed air motor and two air-hoists, from the Ellwood Tin Plate Co., of Ellwood City, Pa.

The Jones & Lainson Machine Co., of Springfield, Vt., makers of machine tools, whose plant has been running on short time for over a year, is now working full time. The sales for September of this year were more than double the average for the eight preceding months.

#### Iron and Steel.

All the puddle furnaces of the Ellis & Lessig Steel & Iron Co., at Pottstown, Pa., were put in blast Oct. 4 after a long period of idleness.

The old plate mill of the Lukens Iron & Steel Co., at Coatesville, Pa., was destroyed by fire Oct. 4. The damage to the building and machinery is estimated from \$40,000 to \$60,000.

The puddle mill of Potts Bros., at Pottstown, Pa., started up Oct. 4 after an idleness of several months.

It is announced that the Cambria Iron Co. will build a 200 x 400 ft. structural steel plant at Johnstown, Pa.

Announcement was made Oct. 5 that the wages of all employees at the Rockwood (Tenn.) furnace of the Roane Iron Co. and of the Sitico Furnace Co., Chattanooga, Tenn., had been advanced 10 per cent.

The Neshannock Sheet and Tin Plate Co., of New Castle, Pa., has been formed to build a new tin plant. The incorporators are George W. Johnson, George W. Hartman, Charles and William Johnston, and William O. Kirkland.

The furnace of the Tonawanda Iron and Steel Co., of North Tonawanda, N. Y., which was lighted by President McKinley shortly after his election last November, by pressing an electric button at his home in Canton, O., and which was shortly afterward withdrawn for repairs, has again been put in blast.

The Iowa Iron Works, Ltd., of Dubuque, Ia., has been organized with a capital stock of \$100,000. The officers are: President, E. M. Dickey; Vice-President, Wm Hopkins, and Secretary, E. P. Kiene.

The La Bell Iron Works of Wheeling, W. Va., have placed an order with the C. & G. Cooper Co., of Mt. Vernon, O., for two direct-connected engines for use in connection with their new tin plate plant.

The Floodwood (O.) blast furnace is being dismantled and removed to Buffalo to be used in connection with the new plant of the Union Iron Works, which is well under way. A new method of casting will be introduced whereby the whole cast will be run into a 60-ton bull ladle, from which the iron will be run in smaller ladles and from them poured into the pig beds. The engine house will be of imitation stone brick, the inside walls and floor being of cream-colored tile. The exposed portions of the stove foundations are faced with tile of Egyptian pattern.

#### New Stations and Shops.

The shops of the Central Railroad of Georgia, at Macon, Ga., were destroyed by fire Oct. 7. The loss is estimated as \$75,000.

The Great Northern has awarded a contract to Schmidt Bros., of West Superior, Wis., for building a new round house at Belknap street in that city. It will be of brick and stone and is to be finished within 90 days.

At a meeting of the City Council of Fargo, N. Dak., Oct. 4, permission was granted to the Northern Pacific to build a temporary wooden depot for use this winter, as it was considered too late to commence building the new station already referred to in this column.

The new station of the New York Central & Hudson River Railroad at 125th street, New York City which was described in our issue of Jan. 8, 1897, has been finished.

Work has been begun on a new passenger station for the San Antonio & Aransas Pass Railroad at Yoakum Tex. It will be 30 x 160 ft., of brick and two stories high, and will be located on the south side of the tracks, about 200 yards east of the present station.

The Lake Superior & Ishpeming Railroad is building a nine-stall roundhouse at Marquette, Mich.

The new shops of the Georgia & Alabama Railroad at Americus, Ga., were finished last week.

The new station of the New York, New Haven & Hartford Railroad at Providence, R. I., was not opened to the public Oct. 10, the date fixed. It is stated that the new station does not meet the approval of the Mayor and City Council of Providence, as it has not been provided with a trainshed. All work being done by the Public Works Department in connection with the new station was suspended Oct. 11.

Plans have been prepared by the Chicago & Grand Trunk and submitted to the Ann Arbor Railroad for a new Union station at Durand, Mich., to cost about \$26,000. They provide for a two-story building, 42 x 124 ft., the second story to be used as headquarters for both of the roads.

Herman & Jones, of Williamsport, Pa., have been awarded a contract to build a small station for the Northern Central at Millersburg, Pa. It is to be ready for occupancy Dec. 1.

Plans are being drawn for a new Union station at Englewood, Ill., to be built by the Chicago, Rock Island & Pacific, Lake Shore & Michigan Southern and Pittsburgh, Fort Wayne & Chicago railroads. It will not be a very large building and no date has yet been fixed for commencing work.

The North Hudson County Electric Railroad has awarded a contract to the Fagan Iron Works, of Hoboken, N. J., for a new terminal station at Spring and Elm streets, West Hoboken, N. J. The station and shed will have room for five stub tracks in addition to accommodating three loops and will be located in such a manner as to provide shelter from the ferry-house of the Delaware, Lackawanna & Western Railroad to the place of boarding cars.

The New Camden station at Baltimore, Md., of the Baltimore & Ohio Railroad was opened to the public Oct. 9. The station has been fully described in the *Railroad Gazette*.

The Pennsylvania Steel Co., of Steelton, Pa., has the contract for the new power station and car barn of the West End street railroad, of Boston, at Forrest Hill.

The contract for the alterations to the 138th street (Mott Haven) station of the New York Central & Hudson River Railroad has been let to Benner & Opdyke, of Philadelphia, Pa. The Pencoyd Iron Works are furnishing the steel work.

#### Interlocking.

The contract for putting in signals for the drawbridge of the Erie Railroad at West Arlington, N. J., has been awarded to the Standard Railroad Signal Co. The machine will have 13 working levers.

#### Car Lighting.

On Oct. 9 the National Electric Car Lighting Company, of New York, shipped 50 installations for electric light, generated by power taken from the car axle, to Topeka, for the equipment of 50 cars of the Atchison. The cars that will have this electric light are: 14 vestibule Pintsch gas cars, 5 vestibule coaches, 4 composite cars, 9 non-vestibule, smoking-room, chair cars, 8 vestibule, smoking-room, chair cars, 10 dining cars. This will be the first equipment with electric light generated from the car axle on a large scale in this country. The cars will run on all main line trains of the Atchison to Kansas City, Denver, El Paso, Los Angeles and Galveston.

#### The New Dock at South Boston.

On Saturday last the Massachusetts Harbor and Land Commission gave out the specifications and called for bids for the construction of the new public dock and pier at South Boston. The bids will be opened on Thursday, Oct. 28, at 12 o'clock.

This pier is to be built on the South Boston Flats, east of and nearly parallel with Pier No. 4 of the New England Railroad. There will be a slip about 362 ft. wide between the walls of the two piers. The new dock will consist of a granite sea wall built on a pile foundation, reinforced by stone and gravel ballast. The area enclosed by the sea wall will be filled to grade 14 ft. above mean low water with the material dredged in preparing the foundations of the sea wall and from the slips at either side of the pier.

The flats on the site of the proposed wall and a platform 50 ft. wide which is to surround it will be excavated to a depth of 30 ft. below mean low water and out to a line 50 ft. beyond the face of the proposed platform. For the wall across the end of the pier, and for a distance of 100 ft. beyond and for each of the side walls, the excavation will be carried to a depth of 20 ft. below mean low water. In these excavations spruce piles are to be driven.

The piles are to be cut off level 6 in. below mean low water. A spruce plank, 4×10 in., will run the whole length of the wall for the spur piles to abut against. The main piles are to be capped crosswise of the wall with 6×12-in. spruce timber fastened to the piles with 1½-in. oak tree-nails, 12 in. long, one to each pile.

The caps are to be covered by a flooring of spruce plank 3 in. thick and 8½ ft. wide. The space between the piles extending nearly to the face of the proposed platform is to be filled with small chip stone or gravel, except that the face of the slope in front of the wall, to the depth of from 18 in. to 3 ft., is to be of larger stone, weighing from 100 to 500 lbs.

The masonry will be 8 ft. wide at its base, 4½ ft. wide at its top and of good quality granite.

The docks on either side and at the end may be dredged to a depth of not more than 35 ft. This contract does not include the 50-ft. platform around the wall, which will be given out separately. The work must be done so as not to interfere with the use of the New England Railroad's dock and pier.

The work must be finished by Jan. 1, 1890.

#### New Tugs for the New Haven.

The New York, New Haven & Hartford has placed an order with the Pusey & Jones Co., of Wilmington, Del., for two steel tug boats for use in towing car floats in the vicinity of New York. They will be 110 ft. long with 25 ft. molded beam and 14 ft. deep. The keel will be solid bar steel and the frames will also be of steel. The hulls will consist of steel plates ½ and ¾ in. thick. The boats will be equipped with vertical direct-acting surface-condensing compound engines, with 20×40×28-in. cylinders. The boilers will be 14 ft. 6 in. high and 11 ft. 6 in. in diameter, and will carry 140 lbs. of steam.

#### Electric Hauling in Japan.

Two companies have lately been formed to build electric roads in Tokio, and a charter has been granted to another company for an electric railroad to run from a point near Kobe for a distance of 20 miles along the sea shore. Kioto is the only city in Japan in which electric cars are running, but we look for the formation of many new companies to build electric railroads before another year passes, and it will not be long before Japan is in the market for complete equipments for electric roads.

#### Nicaragua Canal Commission.

Major William R. Livermore, Corps of Engineers, U. S. A., has been detailed to the Nicaragua Canal Commission in place of Captain Carter, who was originally appointed as engineer officer on that commission. Major Livermore is an officer of distinction and uncommon ability.

#### The Kaiser Wilhelm der Grosse.

The new North German Lloyd steamship Kaiser Wilhelm der Grosse, which recently on her maiden trip broke the westward time record between New York and Southampton, covering the distance in 5 days 22 hours and 46 minutes, arrived at Plymouth, Oct. 6, on her return trip, making the passage from New York to that place in 5 days, 15 hours and 10 minutes. The average speed maintained was 21.91 knots per hour, and had the "Kaiser" continued to Southampton at that rate she should have arrived about six hours later than at Plymouth, and would then have broken the eastward Southampton record of 6 days, 10 hours and 14 minutes, made last month by the American liner St. Louis.

In a recent issue of the *Railroad Gazette* a table was given, comparing certain particulars of some of the largest and fastest North Atlantic steamships. In this table a misstatement was made in regard to the best eastward and westward times of the Cunarders Lucania and Campania, between New York and Queenstown. Both the eastward and westward records for this trip are held by the Lucania, the times made being respectively 5 days 8 hours and 35 minutes, and 5 days, 7 hours and 23 minutes. The best eastward time made by the Campania is 5 days, 9 hours and 18 minutes, and the best westward time, 5 days, 9 hours and 6 minutes. Another error in the table was in regard to the engines of the American liners St. Louis and St. Paul. These engines are quadruple expansion, instead of triple expansion as was stated, and the diameters of the cylinders are 28½ in., 55 in., 77 in. and 77 in., the piston stroke being 5 ft. This error is primarily the fault of an officer of the company, whose manuscript notes state that the engines are triple.

A new steamship, the Kaiser Friedrich, for the North German Lloyd, was launched from the yards of F. Schichau, at Dantzig, Oct. 5, and is expected to be placed in service some time next spring. This vessel is 500 ft. long, 64 ft. beam and 41 ft. in depth, with a displacement of 17,500 tons. Although smaller than the Kaiser Wilhelm, she is expected to be somewhat faster.

#### Rails and Bridge for Mexico.

The Ferrocarriles de Hidalgo y del Nordeste of Mexico have commenced construction on their line running northeast from the City of Mexico and have placed orders for 400 tons of 42-lb. T-rails with the Carnegie Steel Co. and a pin-connected bridge with the Berlin Iron Bridge Co. The gage of this road is 3 ft. 6 in.

Messrs. R. W. Hildreth & Co., 50 Broadway, New York, are the consulting and inspecting engineers.

**The Durant Noiseless Brake-Lever Carrier.**  
The engraving shows a simple and ingenious device for carrying brake levers, which is made and sold by the Hampson Flexible Steam Joint Co., of Lakeport, N. H., under the name of the Durant noiseless carrier. It is intended to do away with the scraping and grinding of the brake levers. As shown here it is applied to an equalizing lever. The rollers run on ½-in.×1½-in. round iron in the slots in the cast-iron hangers. These

price also is lower, and American mills arrange for price and delivery where the rails are wanted, whereas the English makers are not willing to go to this trouble, but will only name prices at the mills.

Large orders for girder rails could be secured if the American makers will arrange to roll the "lip" from the first pass rather than turn it up in the last two or three. This is required by the New South Wales government because the groove cannot exceed ½ in., and the wear on the lip is thereby increased. This method of manufacture requires a universal rail mill, of which

there are one or two in Germany, but none in this country. Several orders in the past have been placed in England under these conditions, but this special feature of manufacture has been omitted. Whereas the manufacturers here probably could not furnish rails under such conditions, they could secure orders on the specified process, and a universal mill would be a good investment for some of our manufacturers, as the process of rolling the lip from commencement of rolling adds to the life of the rail, and is superior to the present method of turning it up.

William Wharton, Jr. & Co. have the contract for over \$20,000 worth of special work for the New South Wales government, comprising the car-barn, switches and

tracks, a number of turnouts, crossovers, switches and crossings, the latter including a complicated cable road and overhead electric road, double track, crossing. The cable road rails for this crossing were shipped to this country from Australia via England.

#### The Gage in Remounting Wheels.

At the last meeting of the Central Railway Club Mr. S. Higgins (Supt. M. P. Lehigh Valley) said: "I have a matter I would like to bring up at this meeting, and that is in connection with the measurement introduced into the M. C. B. Rules that went into effect Sept. 1 for gaging wheels. I refer to the new measurement of 4 ft. 6½ in. being the distance from the outside of one flange to the inside of the flange of the opposite wheel. In connection with this matter there was a very interesting article in the *Railroad Gazette* for Aug. 27, calling attention to a defect that would arise in the mounting of old wheels if that measurement were used. This defect would occur where a pair of second-hand wheels is taken into the shop, one wheel removed and the other wheel left on the axle, then a good second-hand wheel mounted opposite the wheel that is left, the wheel that is left on the axle in the first place having a flange, for instance, that has been worn to 1½ in., which would not condemn it. The article proves very conclusively that if we go ahead and remount the one wheel with the other and use that measurement and that gage distance, that we cannot expect that the wheels will be square with the truck, which would result in the increased wear of flanges and a hard-pulling car."

The result was the following topic for discussion at the November meeting: "How are we to use the measurement 4 ft. 6½ in., as noted on page 10 of the M. C. B. Code that went into effect Sept. 1, when mounting second-hand wheels where it is only necessary to remove one wheel, the wheel left on the axle having worn flange, but not worn enough to condemn it?"

#### More Acceleration Tests.

In our issue of Oct. 1 we gave the results of acceleration tests made at Schenectady with a 24-ton car equipped with four 50-H. P. motors. Since that time additional tests have been made, the one of which, made when the rails were wet, showed the following results: The speed at the end of five seconds, with a car holding 20 persons, was 10 miles an hour, in 10 seconds 30 miles an hour, in 15 seconds 35 miles an hour and in 20 seconds 41 miles an hour. The acceleration up to 15 seconds was the same as the best results recorded in our issue of Oct. 1. The speed in that case after 20 seconds was 38 miles an hour and at the end of 25 seconds was 40½ miles an hour. With dry rails a speed of 41½ miles an hour has been attained in 20 seconds. This series of tests will be continued at Schenectady under varying conditions and with different weights of cars and equipment.

#### THE SCRAP HEAP.

##### Notes.

The Chicago, Milwaukee & St. Paul is to use the Webb & Thompson electric train staff apparatus on the bridge across the Missouri River at Kansas City.

A new fast mail train has been put on from New York to Washington, over the Pennsylvania, leaving New York at 2:10 a. m., and arriving in Washington at 7:30.

On one day recently, the Columbus, Hocking Valley & Toledo delivered 9,218 tons of coal into lake vessels, most of it being transferred by a Brown hoisting machine. This machine unloaded from the cars 3,131 tons in 10 hours.

The Metropolitan Street Railway Co., of New York



Durant Noiseless Carrier.

latter are duplicates, and when in position are riveted. The hooks hang so far apart that the link can be pulled in by turning it a quarter. This device has been received with much favor by those who have used or examined it

#### The Air-Brake Litigation.

The final decision in the protracted case of Westinghouse vs. Boyden will probably be handed down by the Supreme Court of the United States, Monday, Oct. 18. This case was instituted Dec. 12, 1889, in the Circuit Court of the United States, in and for the District of Maryland (Morris, J.), and argued at Baltimore, Nov. 7, 1894. The opinion of Judge Morris was filed March 11, 1895, holding that claims 1 and 4 of the Westinghouse patent, 360,070, were not infringed, but that claim 2 had been. The case went to the Circuit Court of Appeals for the Fourth Circuit, and was argued at Richmond, June 10, 1895. This court (Goff, Simonton and Hughes, JJ.) handed down an opinion Nov. 11, 1895, sustaining Judge Morris in respect to claims 1 and 4, but reversing him as to claim 2.

The case was then taken to the Supreme Court of the United States upon a writ of certiorari, on petition of Westinghouse, Jan. 27, 1896, and argued before that tribunal Oct. 22 and 23 of the same year. A rehearing was ordered by the court, Nov. 16, 1896, which took place March 1 and 2, 1897. The counsel appearing at all hearings were: Frederick H. Betts, of New York, and Geo. H. Christy, of Pittsburgh, for complainants, and Lyman Hill, of Chicago, and Hector T. Fenton, of Philadelphia, for defendants.

#### The Work of a Pneumatic Tool.

The cut represents a steel chip cut from a boiler in the works of the William Cramp & Sons Ship & Engine Building Co., Philadelphia, with a No. 2 Boyer pneumatic hammer made by the Chicago Pneumatic Tool



Co., Monadnock Block, Chicago, Ill. It is 3 ft. 9 in. long, ½ in. wide and from ½ to ½ in. thick and weighs 1 lb. 9½ oz. The chip was taken off at the rate of one foot in four minutes. The No. 2 Boyer hammer weighs about eight pounds and delivers 1,800 blows a minute.

#### Rails for New South Wales.

The government of New South Wales has placed orders for 2,000 tons of 60-lb. and 2,000 tons of 80-lb. T-rails in this country through the Australian Commission houses of Henry W. Peabody and R. W. Cameron & Co., respectively. The former order was secured by the Lackawanna Iron & Steel Co., of Scranton, Pa., and the latter by the Maryland Steel Co., of Sparrows Point. It is probable that additional orders will follow, as the government engineers are favorably inclined to the methods of American manufacture and report that the wearing qualities of American rails are superior to English. The

City, is to recognize length of service in its uniformed employees by placing on the left sleeve of the men's coats one blue stripe for each year of service and one gold stripe for each five years' service.

The report that the state officials of Texas would require the Southern Pacific and other lines to move general offices into that state from New Orleans or elsewhere is unfounded. The law of Texas has for several years required railroads to maintain general offices in that state, and the present action of the Commissioners simply aims to require fuller statistics to be kept at the Texas offices.

The newspapers have revived the story of last spring that the Supreme Court of the United States has made up its mind to decide the Nebraska maximum freight rate cases against the state and in favor of the railroads, but it does not appear that the report has any authority behind it. There is also a story that the Joint Traffic Association, fearing a loss of its suit now pending before the Supreme Court, is seeking a compromise, but this report also seems to be without foundation.

The show-collision season seems to have reopened, after a considerable period of depression, and under more respectable auspices than last year. Heretofore these shows have been got up by individuals, the chief aim being to make money, but now we hear of a collision as a part of a general commercial celebration at Macon, Ga., where 100 floats were in line in a procession headed by the Governor and other dignitaries and the United States Marine Band. In the afternoon 20,000 people went to Central City Park to see the collision.

The shops of the Central Railroad of Georgia, at Macon, were destroyed by fire on Oct. 7. Loss about \$75,000. It is understood that the buildings will be rebuilt at once, though nothing definite has been given out by officers of the road. Forest fires have done great damage in Manitoba and in other parts of Canada, as well as in many places in Indiana, Illinois, Wisconsin and other western states. Five persons were burned to death in towns on the line of the Canada Atlantic. On the Canadian Pacific, in the region of White Mouth, the telegraph poles were burned down, and trains were blocked on account of this and by smoke.

The Chicago Great Western has issued a circular to employees advising them to invest in the 4 per cent debenture stock or the 5 per cent preferred stock A of the company. The debentures have always received their interest, and the company is now earning a dividend on the preferred A. The debentures are now selling at 75 and the preferred stock at 43. The directors think that the latter will advance in price rapidly, and will get a dividend next year. The securities will have to be bought in the open market, as neither the company nor the officers or directors have any for sale. The Secretary will make purchases for employees without charge for his services, payment to be made in monthly installments of \$10 a share.

On the afternoon of Oct. 12, about 5 o'clock, a passenger train of the International & Great Northern was stopped by robbers 12 miles north of Austin, Tex., and the passengers and trainmen robbed of about \$200. The conductor and two passengers who resisted the robbers were wounded by pistol shots. The robbers tried to open the express safe, but failed. A passenger train of the Chicago & Alton was stopped by robbers on the night of Oct. 6 six miles east of Kansas City, but it appears that they got nothing except a little money from the trainmen. The robbers tried to blow open the express safe, but their dynamite failed to go off, and they seem to have got scared away. An extensive gang of freight car robbers have been brought before the courts at Dalton, Ga., and it is said that a number of leading merchants of that town have been shown to be in league with the thieves. The work has been going on for a long time.

#### Electric Railroad Accidents.

The Chicago Suburban Railroad, Chicago, has recently had two bad accidents. This is the road which has become famous by leasing a few miles of track from the Chicago & Northern Pacific Railroad, which was equipped with an overhead trolley. Early in the morning of Sept. 14 a head-end collision occurred between two cars opposite the Harlem racetrack in which 21 persons were injured, some quite seriously. The southbound car had been delayed so that it was not on the siding at the usual meeting point, but a car undergoing inspection was standing on the track. The motorman of the northbound car mistook this for the car he expected to meet and pass at the switch, colliding with the southbound car on the single track. There was a dense fog at the time and both cars were running at full speed. The vestibules of both cars were badly broken and the trucks and motors damaged.

A second accident occurred on the night of Sept. 20 by a car leaving the rails on a curve at Twenty-second street and Desplaines avenue and rolling over. There were but few passengers on the car, so that the number injured was small. One pair of trucks was damaged and one end of the car and a part of the roof was badly broken. The accident was caused by the motorman failing to reduce the speed of the car sufficiently at the curve. In each case the motorman was to blame and the accident was not caused by the failure of any part of the equipment.

#### A Good Beginning.

The following official notice has been sent out to the agents of the Grand Trunk: "You will please notify the parents of young people, and the lads themselves, that they must remain away from the company's platforms and yards and refrain from jumping on and off cars, either standing or in motion. Take the name of each one so notified, and, if after notifying them they persist in disregarding the instructions, refer the matter to the proper official and a detective will be sent out to prose-

cute them for trespass. Let the parents thoroughly understand what steps will be taken." —Exchange.

#### Safety Paper for Tickets.

The Committee of the American Association of General Passenger and Ticket Agents, which has for a year or two been considering the best means of preventing the counterfeiting of tickets, has finally made a report, which will be presented at the semi-annual meeting at St. Louis next week, in which it is recommended that the Association adopt the Perfect Safety Ticket Paper made by the Perfect Safety Paper Co., of Franklin, O. The committee states that it is not to be expected that even the best paper in the world will entirely stop counterfeiting. The experience of the government with national bank bills is evidence of this. The committee rejects all papers the safety of which depends upon a tint placed on the paper after it is made. The recommendation of the paper named is conditioned on assurance being given that the maker will give the Association a bond not to allow it to be used for anything but tickets; that each railroad shall designate certain printers, and employ no others for interline tickets, the printer to be licensed yearly by the Association; that each such printer shall give a bond to the lines of the Association agreeing to adopt the necessary safeguards in handling the paper and the tickets; that a copyrighted watermark of the Association shall appear in every coupon (the initials of the Association in a five-pointed star); that all interline tickets be printed on the new paper by or before Jan. 1, 1900; that each railroad furnish conductors with printed lists of companies whose issue it will accept and that each line give written authority to other companies to issue joint tickets. The committee also believes that it would be well to send the last named list to the Interstate Commerce Commission.

#### Some Exhibits at the Street Railway Convention.

The General Electric Co. will make a representative exhibit covering 1,100 sq. ft. at the Niagara Falls Convention of the American Street Railway Association. Motors mounted on trucks will be shown in motion. On a pair of McGuire double trucks, an axle of one will carry a G. E. 58 forty-five H. P. motor, while on the other axle a 22-in. electric brake will be mounted. On the other truck, one axle will carry a G. E. 51 eighty H. P. motor, while on the other axle will be a 28-in. electric brake. This type of brake is designed for trailer car use or for application to the unoccupied axle of a car with a single equipment only, the stationary part of the brake being held in position by an iron bar attached to the truck frame. On a set of Brill double trucks will be mounted four G. E. 57 fifty H. P. motors with electric brakes. This equipment is similar to that used on the Cleveland & Lorain road, where the cars are run at a very high speed. To secure the necessary space on the axle for motor and brake the wheels on these trucks are dished. A Peckham cantilever truck will carry a standard G. E. 52 twenty-seven H. P. motor, and all will be equipped with series parallel controllers. The controller used on the McGuire truck equipment will be of new B 7 type, that on the Brill truck of the B 8 type. The G. E. 51 and the G. E. 58 equipment will be handled from one controller, either as a double equipment operating both motors, or by cutting out either motor as a single equipment. The wheels between the motor and the axle carrying the electric brake will be geared together by means of bevel gears beneath the platform on which the truck will rest. A G. E. 55 one hundred and seventy-five H. P. motor will also be shown.

In the Barney & Smith Car Co.'s exhibit two G. E. 1,000 motors will be shown on a pair of that company's Class H trucks, while in the Peckham Truck & Wheel Co.'s exhibit two of the G. E. 52 twenty-seven H. P. motors will be shown by that company on one of its trucks. The General Electric Co. has also placed motors on a car for the Duplex Co. of Boston, constructed by the Jackson Sharp Co. of Wilmington, on Peckham cantilever truck, with two G. E. 1,000 motors, electric brakes and the new B 13 controller. This car is illustrated and described elsewhere in this issue, and will be shown in active service on the tracks of the Buffalo & Niagara Falls Railway.

The apparatus showing the operation of the magnetic blow-out will comprise four types of automatic circuit breakers, K, L, M and Q, arranged to be shown breaking currents up to 200 amperes. The H. D. lightning arrester, also fitted with the magnetic blow-out device, will be shown discharging under high potential current obtained from a Thomson X-ray inductorium to represent lightning, the discharge to be followed by current from the 500-volt circuit.

The voltage of the current used will be increased to 2,000 volts, at which potential the lightning arrester will discharge. This is exhibited to show that in cases in which wires carrying high potential current should fall across trolley wires with one grounded, the current will not pass through the motors but will take the path through the lightning arresters.

#### Lake Notes.

The report of the business of the Sault Ste. Marie canals for September has just been issued, and shows a total business for the month of 2,784,179 tons, a falling off from August, as was expected, of about 150,000 tons. The total traffic of this year to date has been 13,589,223 tons, more by 400,000 tons than for any full season till 1895.

The receipts of wheat at Duluth for last month probably exceeded those of any point in the world for any one month on record, being 11,204,000 bu. During the same month there were shipped out 8,037,000 bu. The total movement of all grains for the month, including flour as wheat, was 28,802,000 bu., in and out. Receipts are now somewhat less on account of the lower prices and the decrease in premiums for cash grains.

It is announced that the Bessemer Steamship Co. (the Rockefeller Company) is in the market for a few steel ships of the largest class, probably to carry not much below 7,000 tons each. This company will probably increase its fleet to handle most of the ore over which its owners have traffic control, which will mean a fleet of not far from 40 to 45 ships in the not far off future. As there are now under contract at lake yards tonnage for about 40,000 tons, the construction of even a few vessels for the company will give the yards a good outlook for the winter.

The American Steel Barge Co., at Superior, will put in two steel ships this winter, one a steamer on its own account, to be the largest yet built there, and one a barge for the Minnesota Iron Co. The steamer is to depart quite materially from the whaleback type, for the construction of which this yard was designed. The two will cost about \$400,000.

A steel ship 450 ft. long, and of an estimated capacity for 7,000 tons, is to be built for the Duluth syndicate, of which A. B. Wolvin, of that city, is head.

The Globe Iron Works Co. and the Cleveland Shipbuilding Co. have each under way two steel ships of the

largest class. One of the former will be on company account, and the other for Cleveland parties, and both will be barges. The two by the latter company will be steamers, one for the Cleveland Cliffs Iron Co. and of the largest size. The Detroit Dry Dock Co. will build a fast and very costly passenger ship for the Cleveland and Buffalo route of the Detroit and Cleveland Navigation Co.

The schooner Amazon has taken from Duluth a cargo of 6,306 net tons of ore, beating every cargo carried on any of the lakes.

#### The Trans-Siberian Railroad.

According to newspaper reports from San Francisco, Admiral E. Alixoff, of the Russian Navy, who reached San Francisco from China, Oct. 9, is given as authority for the statement that 500 miles of the Trans-Siberian Railroad has been finished from Vladivostock inland to Khabarovka. This is highly probable since 400 miles of this line was completed over a year ago.

#### Traffic to and from Lake Superior for the Month of September.

Eastbound freight, net tons .....	\$2,529,077
Westbound " " "	255,102
Total " " "	.. \$2,784,179
Total craft United States Canal.....	\$1,931
Canadian Canal.....	681
Total registered tonnage United States Canal.....	\$2,211,833
Total registered tonnage Canadian Canal.....	607,121
	\$2,818,954

#### Notes from Lord Kelvin.

We cut from newspaper interviews the following significant remarks of Lord Kelvin during his wanderings here:

"Lord Kelvin was willing to say briefly in reference to the use of compressed air as the motive power that it had been experimentally tested in Glasgow and been abandoned. It seemed to him that it was a question of location, of local influences, and that no general statement could be made as to the commercial availability of that power, at least for the propulsion of street cars. Yet Lord Kelvin's rather guarded comments about this power suggested that at present at least he has no great faith in it."

"We stopped at Pittsburgh over a day or two, President Thompson and Mr. Ely still being most kind and considerate in their attention to us. They made it possible for us to visit what, in some respects, were as instructive and entertaining works as I have ever seen. We saw in Pittsburgh the three manufacturers, all of them, as I understand, under the direction of the Westinghouse interests, which are engaged in the manufacture of gas engines, electric apparatus and the air-brake. I was immensely instructed and entertained at these places. I saw the gas engines there in operation and I feel justified in saying that I believe this apparatus is going to be of the utmost importance and value in the immediate future, both for the generation of electricity for commercial purposes and for other uses."

"The electrical locomotive, I am afraid, is a thing of the distant future. The steam engine has been found admirably adapted, and it is hard to imagine anything to supersede it. For short distances electricity is certainly applicable on what are now steam railways. In long distances, generations will pass away before the electrical locomotive is used."

"America has managed to go ahead in discoveries for the betterment of motive power. In street cars, phenomenal progress has been made. From England they must come to purchase material for such purposes."

#### Yellow Fever Scare in Texas.

A press dispatch from Austin, Tex., of Tuesday last says that a serious situation is now confronting the people of Texas in the almost complete blockading of travel, owing to the yellow fever scare. "Many trains on all the principal lines have been abandoned, and local lines have stopped running entirely. Both divisions of the Houston & Texas Central and the Southern Pacific are tied up effectually except in the extreme northern portion of the State. Every small town in the State is rapidly organizing a shotgun quarantine, so trains cannot stop except at the big cities. The situation in the entire State is highly panicky. By to-morrow night, unless the situation is relieved, the entire southern and central portion of the State will be practically without any railroad facilities, as all trains will be stopped."

Yellow fever continues at New Orleans and the places in Mississippi which were first infected, but there seems to be no change in the traffic situation.

#### The Sprague Electric Co. Incorporated.

The Sprague Electric Co., with a capital stock of \$5,000,000, equally divided into common and preferred stock, has been incorporated by Albert B. Chandler, Edward E. Johnson and Frank J. Sprague. The principal office will be at Watsessing, N. J.

#### The New East River Bridge Contracts.

On Oct. 12, Justice Smyth, of the Supreme Court, heard arguments on the writ of mandamus issued on the application of O'Brien, McBean & McHale, the contractors who allege that the Commissioners of the New East River Bridge illegally threw out their bid for the Brooklyn anchorage, compelling Mayors Strong and Wurster and the Commissioners to show cause why they should not receive the contract for the work, which contract was given to the Degnon-McLean Construction Co. at a price \$34,229 greater than the bid of the applicants. The Court reserved decision.

#### Oil for the Lakes.

Two of the tugs of the Dunham Towing & Wrecking Co., Chicago, which are out on the lake all the time, are equipped for the use of oil in gales of wind. A mineral oil of 150 deg. test is used. A bag filled with the oil is attached to the bow of a tug and the oil is permitted to drop gradually on to the water. This oil process has been tried by a number of vessels on the lakes with good success, but it is not in general use, for the reason that in severe gales vessels soon find some port and do not have to remain out in gales, as on the ocean.

#### Veterans.

The Baltimore Sun is authority for the statement that the oldest Station Agent in the country in point of service is James A. Gary, the Postmaster-General of the United States. He was appointed Agent at Alberton, Howard County, Md., on the B. & O. Railroad, some 44 years ago, and his name still appears on the pay-rolls of the company. The two next oldest B. & O. Agents are said to be Capt. Charles W. Harvey, at Ellicott City, Md., and John W. Howser, at Relay. They have each been in the service 34 years. The B. & O. has also in actual service a passenger conductor, Capt. Harry Green, who has run trains between Baltimore and Cumberland for 47 years.

## LOCOMOTIVE BUILDING.

The Schenectady Locomotive Works have received an order to build three locomotives for the Ogdensburg & Lake Champlain.

The Schenectady Locomotive Works have received an order to build three 6-wheel saddle tank locomotives for the Seiwa Railway of Japan. They will have 15 x 22 in. cylinders, 48-in. driving wheels, boiler shell of steel, copper fireboxes and staybolts, seamless drawn brass tubes and weigh in working order about 81,000 lbs. The engines will be equipped with automatic vacuum brakes for the driving wheels and train.

The Lake Shore & Michigan Southern has placed an order with the Brooks Locomotive Works, of Dunkirk, N. Y., for 20 ten-wheel freight engines. They will have 17 x 24 in. cylinders, 56-in. driving wheels, with cast steel centers and weigh, in working order, about 108,000 lbs. The boiler will be of the radial stayed extended wagon top type and the engine axles, rods and tender truck axles will be of steel. The engine will be equipped with Westinghouse-American brakes.

The Schenectady Locomotive Works have received an order for four 6-wheel coupled side tank locomotives for the Seoul-Chemulpo Railroad of Korea, this being the first order for locomotives received from that country. They will have 14 x 20 in. cylinders, 42-in. driving wheels with cast-iron centers and American open-hearth steel tires, 28 in. truck wheels, steel tired with cast iron centers, boilers of the radial stayed straight top type, with a working pressure of 140 lbs. The tank capacity will be 960 gals.

## CAR BUILDING.

The Welles & French Co. is building 200 cars for the Continental Fruit Express.

The Metropolitan West Side Elevated Railroad, Chicago, will soon order some additional cars.

The South Carolina & Georgia has placed an order with the Ohio Falls Car Mfg. Co. for 100 flat cars.

The Denver & Rio Grande have not decided to build the 30 narrow-gage cars of 40,000 lbs. capacity at its Denver shops, as stated by a contemporary.

The Ohio Falls Car Mfg. Co., of Jeffersonville, Ind., is rebuilding 300 cars for the Baltimore & Ohio Southwestern and furnishing them with automatic couplers.

It is understood that the Lehigh Valley is considering the purchase of some new cars, but bids have not been asked for nor has anything definite been decided upon.

The Chicago, Burlington & Quincy has about completed the sample box car, which is being built at the Aurora shops as a model for the new cars ordered from the Wells & French Co.

The Philadelphia & Reading has placed an order with the Michigan-Peninsular Car Co. for 200 low side gondola cars of 60,000 lbs. capacity. They will be equipped with Fox trucks, Gould couplers, Kewanee brake beams and hand brakes.

Rumors current last week that the Michigan Central would soon be in the market for cars, are not confirmed by the President, who writes us that the company is not, at present, contemplating the purchase of any additional freight equipment.

The Ensign Mfg. Co., of Huntington, W. Va., has received a contract to build 40 box cars and 63 flat cars of 60,000 lbs. capacity for the Astoria & Columbia River Railroad. They will be equipped with Westinghouse air brakes and Janney couplers.

The General Manager of the Maine Central denies the rumor current last week that the Maine Central would soon be in the market for new cars. The road is not in the market for any cars at present.

The Ohio Falls Car Mfg. Co., of Jeffersonville, Ind., is building one passenger, five box and five flat cars for the Tennessee Northern; one passenger and one mail car for the Mobile & Birmingham and one passenger car for the Sparks, Moultrie & Gulf Railroad.

The Southern Pacific has finished building at its Sacramento shops six vestibule baggage and express cars 60 ft. long and 30 double hopper-bottom coal cars of 60,000 lbs. capacity. The road is also having built 25 new steel tank cars of 6,500 gals. capacity each.

The 200 double-deck sheep cars, which the Chicago, Burlington & Quincy is building at its Aurora shops, and which were mentioned in our issue of Sept. 24, will have the following equipment: Westinghouse air-brakes, Janney couplers, diamond trucks and wood bolsters, and the company's brakebeams, roofs, doors and fastenings. The capacity will be 40,000 lbs.

The Kansas City, Pittsburgh & Gulf has placed an order with Pullman's Palace Car Co. for 10 caboose cars to be built from the same specifications as those ordered from Pullman in the early part of this year. The cars will be 34 ft. over the platforms, 27 ft. 2 in. inside, by 8 ft. 2 $\frac{1}{4}$  in. in width; the height from top of rail to top of running board will be 12 ft. 10 in. They will have Cloud steel trucks with elliptical springs and Tower couplers and be painted with the Detroit White Lead Works' yellow caboose enamel. Malleable castings will be used throughout.

## BRIDGE BUILDING.

**Bonne Terre, Mo.**—The Mississippi River & Bonne Terre has recently contracted for three steel bridges with the Union Bridge Co. The South Big River bridge is composed of two riveted lattice truss spans 125 ft. long each. The St. Francis River bridge has one deck plate girder span 101 ft. long. And the North Big River bridge has a through skew pin-connected span 133 ft. long.

**Chambersburg, Pa.**—The court will be asked to order the erection of a county bridge over Falling Spring at Kennedy street, to cost about \$1,650.

**Eau Claire, Wis.**—Fire has destroyed the Madison street bridge, causing a loss of about \$20,000.

**Fort Assiniboine, Mont.**—Bids will be received at the office of the Chief Quartermaster, St. Paul, Minn., until Nov. 3 for a steel trestle for water tank at this place. Plans and specifications may be had at the office of the Chief Quartermaster, St. Paul, or upon application to the Quartermaster here. D. D. Wheeler, Chief Q. M.

**Fort Plain, N. Y.**—State Superintendent of Public Works Geo. W. Aldridge asks for bids until Oct. 21 for building a lift bridge over the Erie Canal at River street, this place. Plans and specifications may be seen at the office of the Superintendent of Public Works, Albany, N. Y., and at the office of the Assistant Superintendent of Public Works, Thomas Wheeler, Syracuse, N. Y., and at the office of the Assistant Superintendent of Public Works, R. G. Lay, Rochester, N. Y.

**Hull, Que.**—A new iron bridge will be built across the Lievre River, between Masson and L'Ange-Gardien. The chief engineer of public works for the Province of Quebec recently selected the site for the bridge.

**Huntington, W. Va.**—Bids are asked until Oct. 25 for building the sub- and superstructures of three iron bridges. J. S. Sanborn, County Engineer.

**Lancaster, Pa.**—Bids are asked Oct. 21 by the County Commissioners for building a bridge over Pequea Creek near Moyer's mill. The new structure will be of iron, with stone abutments, and will be 120 ft. long.

**Lewisburg, Pa.**—The Commissioners of Union County are asking bids Oct. 21 for a 54-ft. iron bridge across Laurel Run, in Hartley Township, also for a stone bridge of three arches 18 ft. each. Plans and specifications can be seen at the Commissioners' office.

**Mexico.**—The Japapa & Cordoba Railway has placed orders for two steel viaducts and a bridge with the Phoenix Bridge Co. The Rio Texlacaapan viaduct has eight plate girder spans of 30 ft. each. The Rio Texolo has nine plate girder spans of 30 ft. each and two of 40 ft. and the Rio Tlanyalhuapan bridge two plate girder spans, one of 78 ft. and one of 38 ft. 6 in.

**New York.**—The contract for the Willis avenue bridge over the Harlem River has been given to Leonard, Foley & Co., of Philadelphia, at \$1,039,600.

**Perkiomenville, Pa.**—It is proposed to build a steel bridge over Perkiomen Creek. The structure will be 135 ft. long and will cost \$3,000.

**Port Huron, Mich.**—The contract for a steel swing bridge over Black River at Tenth street has been given to the Youngstown Bridge Co., at \$20,640.

**Rochester, Ky.**—The Secretary of War has approved plans for a bridge to be built over Mud River at this place by Butler and Muhlenberg counties.

**Rockville, Conn.**—The contract for the Burke Hill trestle of the New England Railroad has been given to the Berlin Iron Bridge Co., which is also furnishing the bridge across Talcott Pond for the Hartford, Manchester & Rockville Tramway.

**St. Louis, Mo.**—The St. Louis & Meramac Electric Railway has given the contract for a plate-girder bridge across the Missouri Pacific tracks to the Phoenix Bridge Co.

**St. Paul, Minn.**—The Northern Pacific has contracted for a double track plate girder bridge across Maryland street with the Laing Bridge & Iron Works, Chicago.

**South Bend, Ind.**—It is said that the City Engineer has approved the plans submitted by the Michigan Central for a 60-ft. steel bridge across Leeper avenue.

**Washington, D. C.**—The Commissioners of the District have asked two or three engineers to submit designs for a bridge over Rock Creek. The structure will be about 1,800 ft. long and 150 ft. high where the ravine is deepest. The competitors will be paid a reasonable sum for their designs, but not extravagantly.

## RAILROAD LAW—RECENT DECISIONS.

In Kentucky, after a railroad was constructed in a street of a city without authority, an ordinance was passed without authority, authorizing its construction. Subsequently, legislative authority was for the first time conferred on the city to grant the power to construct railroads in its streets, and the city then passed an ordinance reciting the former ordinance and granting the company the right to construct double tracks. The company did not build a double track under this grant or at all. In an action to compel the removal of the track on the ground that it had been constructed without lawful authority, it is held that the effect of the ordinance last referred to was to legalize the construction and operation of the road, and to give full effect to the original ordinance. It is also held that under a requirement in the original ordinance that the road should be so built as not to impede or obstruct the passage of vehicles over its tracks at any point, the company was not compellable so to construct its road that vehicles could pass over it at any point. (Decided in the Ct. of App., May, 1897.)<sup>1</sup>

In the Indian Territory, a railroad company had agreed to carry freight which was subject to the provisions of the Interstate Commerce Act for a lower charge than the rate filed with the Interstate Commerce Commission. Such an agreement is illegal. The railroad company demanded and collected the legal rate upon delivery of the freight at its destination. It is held that the shipper could not recover the amount paid in excess of the rate agreed upon, although he did not know that his contract was illegal. (Decided in the Ct. of App., June, 1897.)<sup>2</sup>

In Missouri, where a brakeman in the employ of a railroad company orders a trespasser, in this case a tramp stealing a ride, to alight from a moving train, and the trespasser is injured while obeying the order, the company is liable for the injury, though no actual force is used. (Decided in the Sup. Ct., May, 1897.)<sup>3</sup>

In Texas, it is held that where an engineer who saw a team of horses driven upon the track at a public crossing, and who could have known that the horses had become frightened, unnecessarily blew the whistle of his engine, thereby causing them to run away, the railroad company was liable for any damage arising by reason thereof. (Decided in the Ct. of App., May, 1897.)<sup>4</sup>

In another Texas case, decided in the same week, a railroad company was held liable for damage arising from the frightening of a horse by the sudden starting of a locomotive standing at a crossing over which, at a signal from the flagman, the horse was being driven. (Decided in the Ct. of App., May, 1897.)<sup>5</sup>

In the same state an action has been successfully maintained against a railroad company, where it appeared that the plaintiff's husband, while working in the employ of the company, on its track, was killed by being run over by a car started upon the track without warning. A rule of the company required warning to be given in such a case. Disregard of this rule by a fellow-servant of the deceased was the immediate cause of the accident. A verdict for the plaintiff was sustained on the ground that the company had not exercised proper diligence in enforcing its rules and that the

fact that the negligence of a fellow-servant of the deceased contributed to the injury, would not excuse it. (Decided in the Ct. of App., May, 1897.)<sup>6</sup>

In Louisiana recovery is allowed for injury sustained by an employee who was engaged in piling lumber upon a car, where the lumber was dislodged and fell upon him because of a jolt caused by coupling the car to other cars without warning. The fact that the employee contributed to the injury by not piling the lumber in a manner which would have withstood the jolt will not avail as a defense. (Decided in the Sup. Ct., June, 1897.)<sup>7</sup>

In Alabama, a railroad company is held liable for damages where it obstructs surface waters by constructing an embankment and causes them to flood adjoining property, by failing to maintain a sufficient culvert. The liability is not excused by the fact that another company whose embankment was below defendant's had failed to provide sufficient outlets and that the land between them had been raised by deposits till it was above the bottom of defendant's culvert, if it was possible for defendant to have provided an escape for the water over its own right of way. (Decided in the Sup. Ct., May, 1897.)<sup>8</sup>

An act of the Montana Legislature limits the right to sell tickets to agents authorized by certificates from the carriers in whose employ they are, and requires each agent within 10 days after his appointment to exhibit his certificate to the Secretary of State and obtain a license as ticket seller, which is directed to be furnished him upon payment to the secretary of a fee of one dollar. The act makes it unlawful for anyone to sell tickets without a license, provides a penalty for violation, provides for the redemption of unused tickets and makes it unlawful for tickets to be sold at other than the regular rate. The act was a Senate bill, and is held to be constitutional, as being an exercise of the police power of the Legislature and not a bill for raising revenue, within the inhibition of the Constitution, which requires such a bill to originate in the House of Representatives. (Decided in the Sup. Ct., May, 1897.)<sup>9</sup>

In an action to recover the penalty allowed by the New York general railroad act to the person overcharged, in case any railroad shall ask or receive more than the legal rate of fare, unless such overcharge is made through inadvertence or excusable mistake, it appeared that after the plaintiff had paid his fare in a cable car, the conductor told him that he must get out at a certain point and take the next car, as the one he was in did not go any further; that after he had boarded the next car, its conductor, notwithstanding the fact that the plaintiff told him he had already paid his fare upon the first car, insisted that he must pay again, and that thereupon the plaintiff left the car, took the following car and paid his fare upon it without objection. It is held that these facts are insufficient to justify a recovery of the penalty imposed by the statute, as it cannot be said that the corporation deliberately asked or received more than the lawful rate of fare. The statute was intended not to afford a remedy for breach of contract, but to punish any attempt to exact more than the legal fare from passengers, and it cannot be extended to cover the case of an attempt to collect what is supposed by a conductor to be the one fare which he is required to receive from a passenger. (Decided in the Sup. Ct., June, 1897.)<sup>10</sup>

In New York, where there is an unusual and extraordinary escape of flame from an electric car, of such character as to justify a witness in stating that she saw the car coming down the street in a blaze of fire, and this condition causes a child who is in the car to become frightened and to jump out of it, and to be thereby injured, the railroad company operating the car is called upon to explain the cause of the fire. Proof upon its part that a fuse burned out is not sufficient to exempt the corporation from the imputation of negligence, the burning out of a fuse not being ordinarily attended by another display than a flash of light. (Decided in the App. Div., June, 1897.)<sup>11</sup>

In Massachusetts, a street railroad company in welding its rails first took up the pavement for 6 ft. in length at the joints and excavated to the depth of 2 $\frac{1}{4}$  ft. on each side of the rails, after which the welding engine was driven to the joint and when the ends of each rail were heated they were welded together. The engine was then driven to the next joint while another gang of men filled up the excavation and replaced the pavement. The plaintiff, a boy 10 years old, in attempting to cross the street, stepped with bare feet on an unguarded rail which had so far cooled that it was black, and was burned. On this state of facts a verdict assessing damages against the company on the ground of its negligence is sustained. (Decided in the Sup. Ct., June, 1897.)<sup>12</sup>

In the same state an employee injured while attempting to block an engine on a steep grade, by slipping and having his glove catch on a spike in a sleeper, so that he could not get his hand away before it was run over, who knew that second-hand sleepers were being used and had seen spikes in some of them while they were in piles, will be held to have assumed the risk of the injury, though he did not know of the particular spike which caused it. (Decided in the Sup. Ct., May, 1897.)<sup>13</sup>

<sup>1</sup> City of Owensboro vs. Owensboro & N. R., 40 S. W., 916.

<sup>2</sup> M. K. & T. vs. Bolles, 40 S. W., 899.

<sup>3</sup> Farber vs. Missouri Pac., 40 S. W., 932.

<sup>4</sup> Gulf, C. & S. F. vs. Sinzer, 40 S. W., 1004.

<sup>5</sup> Houston & T. C. vs. Abrahams, 40 S. W., 1034.

<sup>6</sup> Texas & P. vs. Everhart et al., 40 S. W., 1060.

<sup>7</sup> Ragland vs. St. L. I. M. & S., 22 S. W., 366.

<sup>8</sup> Shah vs. Alabama, G. S., 22 S. W., 449.

<sup>9</sup> State vs. Bernheim, 49 Pac. Rep., 441.

<sup>10</sup> Stewart vs. Metropolitan, 20 Misc., 605.

<sup>11</sup> Poulsen vs. Nassau Electric, 18 App. Div., 221.

<sup>12</sup> Kane vs. West End, 47 N. E., 501.

<sup>13</sup> O'Neill vs. Keyes et al., 47 N. E., 416.

## MEETINGS AND ANNOUNCEMENTS.

## Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

*Central, of New Jersey*, quarterly, 1 per cent., payable Nov. 1.

*Cincinnati, Sandusky & Cleveland*, semi-annual, preferred 3 per cent., payable Nov. 1.

*Georgia Railroad & Banking*, quarterly, 2 $\frac{1}{4}$  per cent., payable Oct. 15.

*Lake Erie & Western*, quarterly, preferred, 1 $\frac{1}{4}$  per cent., payable Nov. 15.

*North & West Branch*, regular, 3 per cent., and extra 1 per cent., both payable Nov. 1.

*Cleveland Electric*, quarterly,  $\frac{3}{4}$  per cent., payable Oct. 5.

## Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

*Chicago, Burlington & Quincy*, annual, for election of directors and other business, Chicago, Ill., Nov. 3.

*Manhattan*, annual, for election of directors, New York, Nov. 10.

*New Orleans & Northeastern*, annual, for election of directors, New Orleans, La., Nov. 3.

*Northern Pacific*, annual, for election of directors, New York, Oct. 21.

#### Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Street Railway Association* will hold its sixteenth annual convention in Convention Hall, Niagara Falls, Oct. 19-22, 1897.

The *Association of Railway Superintendents of Bridges and Buildings* will hold its seventh annual convention at the Brown Palace Hotel, Denver, Col., beginning Oct. 19, 1897.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p.m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p.m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p.m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p.m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p.m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p.m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineers' Club of Columbus*, (O.), meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p.m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p.m.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p.m.

The *New England Railroad Club* meets at Westover Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p.m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p.m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p.m.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p.m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p.m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sorge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p.m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p.m., to bear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736 1739 Monadnock Block, Chicago.

#### American Academy of Railway Surgeons.

At the fourth annual meeting of this Society, which was held in the Auditorium, Chicago, Oct. 6 to 8, Dr. R. Harvey Reed, Columbus, O., was elected President; Dr. W. J. Mayo, Rochester, Minn., First Vice-President; A. D. Bevan, Chicago, Second Vice-President; Dr. D. C. Bryant, Omaha, Secretary, and Dr. C. B. Kibler, Corry, Pa., Treasurer.

#### Northwest Railway Club.

A regular meeting of this Club was held at Hotel Ryan, St. Paul, on Oct. 14, at which the annual election of officers took place. Discussions were held on the following papers: "The History of Blacksmithing and Methods of Instruction in Forge Work at the University of Minnesota," by Prof. J. H. Gill, and "Tool Steel and Tool Dressing," by Mr. Horace Pentecost.

#### Western Railway Club.

At the next meeting of this Club, which will be held on Oct. 19, the papers to be read and discussed are: "Washing Out Locomotive Boilers," by Mr. John Mackenzie, and "Heating Passenger Cars," by Mr. Wm. Garstang. The questions for discussion are: "Is it Desirable to Corrugate or Cup Locomotive Firebox Sheets?" and "What Method Can be Used for Fumigating Passenger Cars That Will Not Injure the Interior Finish?"

#### Engineers' Society of Western New York.

At the last regular meeting of this Society, held on Oct. 4, a paper was presented by Mr. Henry Vier, entitled "A Description of that part of the grade crossing improvement work recently completed by the N. Y. C. & H. R. R. Co. under its contract with the city of Buffalo." Suitable resolutions were passed in respect of the memory of Mr. Geo. E. Mann, the Society's first President, whose death occurred on Oct. 2, and a committee on nominations was appointed to nominate candidates for officers for the ensuing year.

#### New York Railroad Club.

At the meeting of the New York Railroad Club, to be held Oct. 21, a paper will be presented by Mr. W. B. Potter, Chief Engineer of the Railway Department of the General Electric Company, the subject of which will be "The Engineering Side of Standard Railroading by Electricity." It is hoped that proofs will be in the hands of the members at least a week before the meeting and that a useful discussion may be had. Certainly the subject is one of great interest and Mr. Potter is especially competent to treat it.

#### Civil Engineers' Society of St. Paul.

A regular meeting of the Civil Engineers' Society of St. Paul was held Oct. 4. Mr. C. A. Alderman read a paper on the Chippewa Valley Electric Railway, an up-to-date system of about 22 miles nearly completed. Power is to be furnished for 20 years at \$6 per horsepower.

Mr. Loweth exhibited the results of some paint tests Twenty odd samples of black and more or less rust roughened plates of sheet iron which had undergone six months exposure to locomotive smoke while suspended from the roof of the Union depot train shed, about 50 ft. above the tracks. The iron plates, new and bright, had each received one coat of paint and had been subjected to equal exposure. The red lead sample gave the best results; next came the white lead, followed by the iron oxides and an asphaltum, which were generally in much better condition than the graphites. An anti rust specimen was the brownest spectacle of the lot.

#### Locomotive Foremen's Club.

The foremen of locomotive repairs of a number of railroads entering Chicago, organized the Locomotive Foremen's Club Friday evening, Oct. 1. During the month of October meetings will be held Friday evening of each week for the reading and discussion of papers. After the first month meetings will be held less frequently.

The officers elected for the ensuing year are as follows: President, Fred. E. Pyle, Atchison, Topeka & Santa Fe Ry.; First Vice-President, C. J. Quinby, Wisconsin Central Lines; Second Vice-President, J. M. Thompson, Chicago & Northwestern Ry.; Third Vice-President, A. J. Cummings, Chicago & Western Indiana R. R.; Secretary and Treasurer, A. C. Beckwith, Illinois Central R. R.

At the meeting of Oct. 8 Mr. Bishoff, of the Nathan Mfg. Co., presented a paper on "Sight Feed Lubricators." At the following meeting, Oct. 15, Mr. W. J. Edding, General Foreman of the Atchison, Topeka & Santa Fe, will present a paper entitled "Stayholts," and Mr. F. W. Furry, of the Ohio Injector Co., a paper on "Injectors." The regular meetings will be held at the Correspondence School of Locomotive Engineers and Firemen, 331-335 Dearborn street, Chicago.

#### Engineers' Club of St. Louis.

A regular meeting of this Club was held Oct. 6, at which a letter from Mr. F. B. Maltby, Assistant U. S. Engineer in charge of the government works on the Osage River, was read, inviting the Club to visit the new dam now being built near Osage City. A motion was passed authorizing the Executive Committee to arrange for an excursion to this place. Applications for membership were received from seven people. Mr. Henry Branch and Mr. Charles W. Hawkes, having been favorably reported, were elected members of the Club.

A paper entitled "The Electrolysis of Caustic Soda," by Mr. A. L. McRae, was read. In the absence of Mr. McRae the paper was read by Mr. Miller. A process of manufacturing caustic soda from common salt by electrolytic methods was described and some figures given as to the cost of manufacture. This process has been used in England and Germany, but is not in use in this country. The paper described how the by-products, hydrogen and chlorine, may be utilized in heating the solution for concentration and for making bleaching powder. Following this paper there were exhibited a number of lantern slides showing types of waterworks engines and sewage pumps. Mr. M. L. Holman explained the slides and pointed out the features of interest connected with each engine.

#### American Street Railway Association.

The following papers will be read at the Niagara meeting of the American Street Railway Association to be held next week from Tuesday to Friday, inclusive: "Application of Electricity to Railroads now Operated by Steam Power"; "The Best Method of Settling Damage Cases and the Prevention of Accidents by the Use of Fenders and Otherwise"; "Producer Gas for Use in Street Railroad Power Houses and Gas Engines"; "Storage Batteries for Street Railroads"; "Long Distance Transmission and the Use of Multiphase Currents for Ordinary Street Railroads"; "Municipal Ownership of Street Railroads" and "The Discipline of Employees."

The building for the exhibits, which is 120 x 154 ft., has been completed, and the first floor of this will be entirely taken up with street railroad supplies. The meetings will be held on the second floor. The usual reduced rates on railroad tickets have been arranged for with the traffic associations, the rate being a fare and a third for the round trip. The reduction is, however, contingent on the sale of a certain number of tickets, and all delegates are requested to inform Mr. T. C. Pennington at a very early date. The annual dinner will be held at the International Hotel, Thursday, Oct. 21, at 9 p.m. Many excursions have also been arranged.

A special sleeping car train will leave Grand Central Station, New York, via New York Central & Hudson River Railroad, at 7:30 p.m., Monday, Oct. 18. From Boston, via Boston & Albany Railroad, regular 3:00 p.m. train same date, connecting with special at Albany, arriving Niagara Falls 8:25 a.m., Tuesday, October 19. From Philadelphia, via the Lehigh Valley (Reading station), 7:30 p.m., arriving Niagara Falls 7:25 a.m. From Washington, via Pennsylvania Railroad, 7:10 p.m.; Baltimore, 8:25 p.m.; Harrisburg, 12:01 a.m., arriving Niagara Falls 10:43 next morning.

#### PERSONAL.

—Mr. F. P. Tate, Auditor and Cashier of the Morris town & Cumberland Gap, has resigned.

—Mr. Isaac Booth Futvoye, Division Superintendent of the Central Vermont, at St. Johns, Que., committed suicide Oct. 7.

—Mr. C. F. Lisler, formerly Trainmaster of the Eastern Division of the Wabash, died at Toledo, O., Oct. 1, at 50 years of age.

—Mr. William J. Dickinson, Auditor of Receipts of the Louisville & Nashville since 1892, has resigned to enter other business.

—Mr. Monroe B. White, Superintendent of the Eastern Division of the American Express Co., died in Buffalo, N. Y., Oct. 8, at about 70 years of age.

—Mr. Albert H. Chapman, Chief Clerk in the office of Secretary Myers of the Chicago, Milwaukee & St. Paul

died at his home in Milwaukee, Wis., Oct. 4, at 50 years of age.

—Mr. Gustave Fischer, Chief Assistant Engineer of the government tramways of New South Wales, is in the United States collecting data on the subject of building and equipping electric roads, and will attend the convention of the American Street Railway Association, at Niagara Falls, next week. Mr. Fischer will sail from San Francisco for home Nov. 11.

—Mr. Gustavus A. Worth died at Salida, Col., Oct. 5. For many years he was employed in railroad work. He was with the New York & Erie in 1851 and later with the Williamsport & Elmira. He served through the war, entering as major with the 167th Pennsylvania Volunteers. In 1860 he became Chief Engineer and Superintendent of the Pittsburgh & Western and two years later went West, taking charge of the building of the Oregon Short Line.

—Mr. S. S. Neff has been appointed Superintendent of the Union Elevated, Chicago, and will have direct charge of the structure, operation of all trains while on the loop and the power-house. He will report to the Board of Managers. Mr. Neff is a graduate of the Rensselaer Polytechnic Institute, and for six years was connected with the engineering department of the Pennsylvania Railroad. He was Superintendent of the Cornwall Railroad for four years and held a similar position on the Great Northern, later becoming General Manager of the Pacific Coast Navigation Company. He has also been connected with the construction of the Lake Superior & Ishpeming Railway in Michigan.

—Mr. William Wallace Heafford, for the past four years District Passenger Agent of the Chicago, Milwaukee & St. Paul, at Milwaukee, died Oct. 6 at Chicago, at the home of his brother, Mr. George H. Heafford, General Passenger Agent of the same road. While he had been suffering with heart disease for about a year, he had been able to attend to business until about two weeks ago. Mr. Heafford was born in Clinton, Conn., 47 years ago and had been in railroad service for 32 years, serving the Chicago & Northwestern, Illinois Central, Western Wisconsin, Detroit, Lansing & Northern, Cincinnati, Hamilton & Dayton, Chicago Grand Trunk and the Chicago, Milwaukee & St. Paul. He leaves two sons and one daughter, his wife having died about a year ago.

—On Wednesday, Oct. 6, William B. Bement, one of the foremost machine tool designers of his day, died at his home in Philadelphia. Mr. Bement was born on the farm of his father, Samuel Bement, in New Hampshire, on May 10, 1817. Here he spent his early years, going to the district school in the winter, and in the summer he helped his father on the farm and made wrought-iron nails. When only a small boy, he had a great liking for machinery, and as the years passed this love steadily developed, and that inventive faculty, which was the basis of his successful career, appeared.

In 1834 he went as apprentice to Moore & Colby, of Peterboro, N. H., makers of cotton and woolen machinery. Here he successively rose to the positions of shop foreman and superintendent of the works, which latter position he attained before he was quite 20 years old. Soon after this he was taken into the firm, one of the partners having withdrawn. Here he stayed three years, devising in that time many valuable things. In 1840 he went with the Amoskeag Machine Works, in Manchester, N. H., but he stayed here only a short time, and in 1842 he made a trip to the West. There he was to have had charge of a manufactory of woolen machinery, at Mishawaka, Ind., but the destruction of the works by fire changed all his plans, and he was forced to earn a living by doing blacksmithing and gunsmith work. In consequence of his mechanical skill, however, he soon obtained a position with the St. Joseph Iron Co., and shortly became Superintendent of its shops.

Returning to the East in 1847, he at once became connected with the Lowell Machine Shops. Here, for four years, large scope was given to his ability as an inventor and designer, and in that time the reputation and popularity of the machines made by the works were greatly enhanced. At the end of those four years, or in 1851, Mr. Bement went to Philadelphia, where he became associated with Mr. E. D. Marshall in the Industrial Works. Mr. Bement took charge of these, and immediately devoted himself to the invention and design of machine tools, and gradually developed the small shop into an extensive plant. In 1855 a consolidation of the enterprise with which Mr. Bement was connected and that headed by Mr. Frederick B. Miles took place, to the interests of which firm Mr. Bement devoted the energies of his latter years. In 1888 he retired from active management to spend his time in the enjoyment of a well-earned leisure.

In his prime Mr. Bement was in the first rank of machine tool designers along with Whitworth and William Sellers. Mr. Bement was a lover of art, and possessed a notable collection. He kept his artistic treasures at his home, where he freely placed them at the service of artists and students. Mr. Bement was a Director of the Academy of Fine Arts in Philadelphia and of the Academy of Design for Women, and had been a member of the Union League Club of that city since 1866.

#### ELECTIONS AND APPOINTMENTS.

*American Pacific*.—The officers of this company, whose incorporation is noted in another column, are as follows: President, R. B. Hunter, Ottawa, Kan.; Secretary, C. R. Kinchen, Breckenridge; Tex; Chief Engineer, Dwight L. Filley, Pairiso, Distrito Del Puerto Cortez, Honduras, Central America.

*Atchison, Topeka & Santa Fe*.—The titles of J. J. Warner, Oakland, Cal., traffic office, and that of H. R. Sterne, of San Jose, Cal., traffic office, have been changed from Freight and Passenger Agents to Commercial Agents. F. E. Valentine has been appointed Commercial Agent at Sacramento, Cal., to succeed G. W. Railton, previously Freight and Passenger Agent.

*Baltimore & Ohio*.—The title of S. B. Hege has been changed from District Passenger Agent to Division Passenger Agent. D. D. Courtney has been appointed General Traveling Passenger Agent, with office at Baltimore, Md.

*Baltimore & Ohio Southwestern*.—The office of the District Passenger Agent at Cincinnati, O., held by Carleton W. Paris, will be abolished. His work is to be done by J. B. Scott, Jr., Traveling Passenger Agent, with headquarters at Cincinnati. The present City Passenger Agent, S. T. Seeley, will become Traveling Passenger Agent outside of Cincinnati. City Passenger Agent W. P. Townsend, of St. Louis, goes to Cincinnati as Chief Clerk under General Passenger Agent O. P. McCarty. G. F. Randolph, Traveling Passenger Agent at Vincennes, Ind., will have his headquarters changed to St. Louis. G. M. Taylor, Traveling Passenger Agent at

St. Joseph, Mo., will have his headquarters removed to St. Louis. These changes will take effect about Oct. 15.

*Berkeley Springs & Potomac.*—At a meeting of the Directors of this line of the Baltimore & Ohio, held at Hancock, Md., Oct. 10, Thomas H. B. Dawson, of Berkeley Springs, heretofore Secretary, was elected President to succeed B. F. DeFord, deceased. W. H. Disher was elected Secretary and J. Hammond Siler, Attorney, to succeed J. Rufus Smith, deceased.

*Buffalo, St. Mary's & Southwestern.*—B. E. Weldorf has been appointed General Superintendent, to succeed E. Ford.

*Carolina Central.*—At the annual meeting, held at Wilmington, N. C., Oct. 7, W. W. Chamberlain, Norfolk, Va., was made a new director.

*Central of Georgia.*—At the annual meeting of stockholders, held at Savannah, Ga., Oct. 12, G. Gunby Jordan, of Columbus, Ga., was chosen a director, succeeding G. M. Williams, of the same city.

*Central Pacific.*—Isaac E. Gates, having returned from Europe, has been re-elected a director and Third Vice-President and Col. J. C. Kirkpatrick has retired from the position in the Board to which he was elected in July to secure a quorum.

*Chicago Great Western.*—H. B. Hobart has been appointed Traveling Freight Agent, with headquarters at St. Joseph, Mo., to succeed F. R. Quirk.

*Chicago, Milwaukee & St. Paul.*—J. E. Preston has been appointed Commercial Agent, with headquarters at Denver, Col., to succeed B. C. Pinney, resigned. W. J. McDonald has been appointed Contracting Agent of the freight department, with headquarters at San Francisco. H. J. Doolittle, Contracting Agent, has been transferred from Los Angeles, Cal., to San Francisco, and has been succeeded by F. E. Fiske. Eugene Duval has been appointed Contracting Agent, with headquarters at Omaha, Neb., to succeed J. E. Preston. W. J. Hoddinott has been made Traveling Freight Agent, with headquarters at Helena, Mont.

*Chicago, Peoria & St. Louis.*—F. A. Williams has been appointed General Passenger and Ticket Agent, with headquarters at St. Louis, to succeed W. J. McLean, resigned. The general passenger and ticket offices have been removed from Springfield, Mo., to St. Louis.

*Chicago, Rock Island & Pacific.*—F. A. Willard has been appointed General Agent, with headquarters at St. Paul, Minn., to succeed E. A. Whitaker.

*Cincinnati Northern.*—O. A. Wilson, Cashier, has resigned and that office will be abolished. The duties have been assumed by W. F. Booth, Auditor.

*Columbus, Hocking Valley & Toledo.*—The main offices of this company will be removed from the Deshler Building to the Spar Building on East Broad street, Columbus, about Jan. 1, 1898.

*Columbus, Sandusky & Hocking.*—D. D. Byers, for several years Chief Clerk in the Auditor's Department, has been made Traveling Auditor and he will be succeeded by J. E. Merion.

*Cumberland Valley.*—At the annual meeting, held at Harrisburgh, Pa., Oct. 4, Frank Thomson, President of the Pennsylvania, was elected an additional director of the Cumberland Valley, a branch line of the Pennsylvania.

*Denver & Rio Grande.*—Mr. C. H. Quereau, General Foreman of the Burlington & Missouri River at Plattsburgh, Neb., has been appointed to succeed Mr. W. H. V. Rosing as Master Mechanic of the First Division of the Denver & Rio Grande with headquarters at Denver, Col.

*Detroit, Grand Haven & Milwaukee.*—At the annual meeting of the line of the Grand Trunk, held at Detroit, Mich., Oct. 4, G. B. Reeve, of Montreal, Que., was elected a director.

*Erie.*—R. F. Longacre has been appointed Division Freight Agent of the Meadville Division, with headquarters at Meadville, Pa., to succeed H. C. Hastings, deceased.

*Great Northern.*—C. C. Ponsonby has been appointed Chief Train Despatcher at Minneapolis, Minn.

*Hot Springs Terminal.*—The officers of this company, referred to in another column, are as follows: President, J. B. Mellard; Vice-President, E. A. Douglas; Secretary, C. H. Weaver; Treasurer, E. W. Rector; Attorney, E. A. Douglas. The main office of the company is at Hot Springs, Ark.

*Illinois Central.*—W. G. Bruen, previously Acting Assistant Secretary, has been appointed Assistant Secretary. Hunter C. Leake has been made General Agent, with headquarters at New Orleans, La.

*Intercolonial.*—W. H. Olive has been appointed Eastern Freight and Passenger Agent, with headquarters at Montreal, Que., to succeed G. W. Robinson.

*Kansas City, Pittsburgh & Gulf.*—F. S. Hammond, Assistant General Manager at Kansas City, has resigned, having secured the contract for supplying ties for the road. David Patterson, Master Mechanic of the Southern Division, has been transferred to the Northern Division with headquarters at Pittsburg, Kan., to succeed E. Dawson, resigned. J. B. Stubbs, formerly General Foreman of the Union Pacific, succeeds Mr. Patterson at Shreveport, La.

*Lehigh Valley.*—After Nov. 1 the tracks composing the Buffalo, Pennsylvania & New York and Wyoming Divisions are to be changed as follows: The Buffalo Division to include the main line between the State Line at Sayre and Buffalo, the Depew & Tonawanda, Rochester Southern, Middlesex Valley, Seneca County and the Ithaca Branch. The Pennsylvania & New York Division will include the main line from Falling Springs to State Line at Sayre, the Waverly & State Line, State Line & Sullivan and the Bowman's Creek Branch. The Wyoming Division will include the main line from Mauch Chunk to Falling Springs, Bear Creek Branch, the Mountain Cut-off, West Pittston Branch, and all colliery branches in the Wyoming Valley.

On Oct. 18, 1897, the office of the Superintendent of Car Department will be moved to South Bethlehem, Pa.

On Nov. 1, 1897, the title of Mr. John S. Lentz, now Superintendent of Car Department, will be changed to Assistant Superintendent of Motive Power. He will have control of all car work and car shops, in so far as may be necessary to insure the efficiency of the car equipment, and adherence to approved standards, and will report to the Superintendent of Motive Power.

*Litchfield, Carrollton & Western.*—George W. Rich, heretofore Assistant Auditor, has been appointed Auditor, with headquarters at Carlinville, Ill.

*Louisville & Nashville.*—At the annual meeting, held at Louisville Oct. 6, Fred A. Horsey, of New York, was elected a director, to succeed his father, J. A. Horsey, deceased.

*Louisville, Evansville & St. Louis.*—B. F. Mitchell has been appointed General Agent, with headquarters at Evansville, Ind.

*Memphis & Charleston River.*—H. S. Lemmon has been appointed Soliciting Freight Agent, with headquarters at Sheffield, Ala.

*Mexican National.*—Thomas Purcell has been appointed Assistant Superintendent, with headquarters at Matamoras, Mex., to succeed H. Shepherd, deceased.

*Minneapolis, St. Paul & Sault Ste. Marie.*—H. A. Olmsted has been appointed Traveling Passenger Agent, with headquarters at Minneapolis, Minn., to succeed H. W. Hankinson, resigned.

*Missouri, Kansas & Texas.*—H. F. McFarland has been appointed Commercial Agent, with headquarters at St. Louis, to succeed R. H. Vaughan. R. W. Hockaday has been made Traveling Freight Agent, with headquarters at Kansas City, Mo.

*Missouri Pacific.*—E. O. Man, Division Superintendent of the Central Branch, with headquarters at Concordia, Kan., has been appointed Division Superintendent of the Western Division, with headquarters at Atchison, Kan. He will be succeeded by I. H. Luke.

*Mobile & Ohio.*—The General Passenger Department has been removed from Mobile, Ala., to 419 Olive street, St. Louis.

*New York, Chicago & St. Louis.*—R. H. Morris has been appointed Contracting Agent, with headquarters at St. Louis, Mo.

*Norfolk & Western.*—Preston Butler has been appointed Traveling Freight Agent of the Great Southern Dispatch, with headquarters at Philadelphia, to succeed H. E. Whitaker.

*Northern Pacific.*—At a meeting of the recently elected directors, held in New York City, Edward D. Adams was permitted to retire from the position of Chairman of the Board at his own request and that office abolished. The duties discharged by Mr. Adams will devolve upon the new Vice-President, Daniel S. Lamont.

*Omaha, Kansas City & Eastern.*—R. W. Blakeslee has been appointed General Freight and Passenger Agent, with office at Quincy, Ill., to succeed J. V. Parker.

*Orange, Call & Pine Belt.*—The officers of this company, noted in another column, are as follows: President, Treasurer and Purchasing Agent, D. Call, Orange, Tex.; Vice-President, General Manager and Superintendent, George Adams, Call, Tex.; Master Car Builder, J. J. Culley, Salem, Tex.; Chief Engineer, R. C. Myn, Salem; Roadmaster, R. A. Hamlet, Salem.

*Oregon Railroad & Navigation Co.*—C. A. St. Clair has been appointed General Agent, with headquarters at Butte, Mont., to succeed W. E. Coman.

*Peoria, Decatur & Evansville.*—At the annual meeting, held at Peoria, Ill., Oct. 5, Robert S. Anderson, Stephen J. Curry, John J. Moore and Herbert H. Drake were elected directors to fill vacancies.

*Philadelphia, Reading & New England.*—E. M. Humstone, Assistant Superintendent and Master Mechanic, has resigned. H. Schaeffer has been appointed Master Mechanic and the office of Assistant Superintendent has been abolished.

*St. Louis, Peoria & Northern.*—J. J. Hughes has been appointed Roadmaster, with headquarters at Springfield, Ill. A. L. Moler, formerly Master Mechanic of the Cincinnati, Hamilton & Dayton, has been appointed to a similar position with the St. Louis, Peoria & Northern, with headquarters at Springfield, Ill.

*Southern.*—Alexander S. Thweatt, Eastern Passenger Agent, with office at 271 Broadway, New York City, has had his jurisdiction extended to cover New England and the Dominion of Canada east of Kingston.

*Southern Pacific.*—J. B. Dunne has been appointed Superintendent of Telegraph Lines, with headquarters at San Francisco.

*Union Pacific.*—G. C. Hirst has been appointed Traveling Passenger Agent, with headquarters at Cincinnati, O. E. H. Green has been appointed Passenger Agent, with headquarters at Ogden, Utah. Newell Petree has been appointed Traveling Passenger Agent, with headquarters at Salt Lake City, to succeed A. J. Ratcliffe, transferred to St. Louis.

*Wheeling & Lake Erie.*—W. P. Shauefle has been appointed Car Accountant, with headquarters at Toledo, O., to succeed J. E. Bratten.

#### RAIL ROAD CONSTRUCTION, INCORPORATIONS, SURVEYS, ETC.

*Alaska Railroads.*—If press reports can be credited, the Chilkoot Railroad & Transportation Co., of Tacoma, Wash., has already been building a railroad from Dyea at tidewater eight miles toward the Dyea Cañon. From Dyea Cañon it is proposed to cross the Chilkoot Pass to Crater Lake by a system of aerial tramways, for the building of which a contract has been let to the Iron Company, Trenton, N. J. The first four miles of these tramways will extend from the Cañon to Sheep Cañon, with a rise of 1,000 ft., the second section from Sheep Camp to Summit, 3½ miles, with a rise of 2,500 ft., and thence to Crater Lake, with a fall of 500 ft. It is stated that the tramway will have a capacity of 120 tons daily. The Chilkoot Railroad & Transportation Co. was incorporated some time ago, and has since put three parties of surveyors at work. Surveys have also been made for a telegraph line to connect Dyea with Lake Linderman. Among those interested in the enterprise are: George B. Dodwell, Manager of the Northern Pacific Steamship Co.; Hugh C. Wallace, President of the Washington & Alaska Steamship Co., and W. G. Pearce, General Superintendent of the Northern Pacific, Tacoma, Wash.

Projectors of various railroads in Alaska will find it necessary to have their projects approved by special acts of Congress. Under an act of Congress of March 3, 1873, railroads receive right of way over the public lands of the United States through permission of the Secretary of the Interior, but no provision is made in this act for public lands in Alaska.

*American Pacific.*—The projected route of this company, whose incorporation was noted Sept. 24, is as follows: From Savannah, Ga., and Jacksonville, Fla., west to San Diego, Cal.; from Velasco, Tex., a branch north to the Canadian line; from Dallas, Tex., a branch south to the Bahia de Topolobampo, Mex. The officers will be found in another column. While the name adopted is fairly comprehensive, we are still astonished at the moderation of the projectors. They might have called it the "Cosmopolitan."

*Atlanta, Valdosta & Western.*—Application was filed with the Secretary of State of Georgia Oct. 9 for a charter for a line from Valdosta, Ga., southeast about 130 miles through Crawford, Fla., a point on the Florida Central & Peninsular, to Jacksonville, Fla. It is stated that 27 miles of this road are already in operation under the management of contractors. Among the incorporators are G. S. Baxter and Walton Ferguson, Jr., of New York.

*Augusta Southwestern.*—This company is being organized in Georgia to build a railroad from Trenelle southwest to Cordele, Ga., about 100 miles. Among those interested are: James U. Jackson, Augusta, Ga.; H. B. Massey, Trenelle; James T. Wright, Macon; J. Pope Brown, Hawkinsville and L. Q. Stulbs, Dublin.

*Beaumont, Wharf & Terminal.*—One mile of track has been built and the rails and ties purchased for the entire line. This is to be a belt line around the city of Beaumont, Tex., 8.5 miles. All financial arrangements have been made for building, but are not available until the entire right of way has been secured, which it is expected will be accomplished in the course of 60 or 90 days. W. W. Willson, Beaumont, Tex., is Vice-President.

*Bruton & Pineora.*—Five hundred men are said to be at work grading and laying tracks on this new road. The company was given a new charter in March (see this column for March 19). As originally proposed the road was to extend from Macon, Ga., to Savannah, 180 miles, of which only 28 miles, from Bruton southeast to Stillmore, had been built at the time of the reorganization. The present work is from Stillmore in the direction of Pineora. Thirty-six miles of the road have been laid with rails and several miles more graded. A gap of 40 miles remains between the terminus and Stillmore. A. F. Daley, Wrightsville, Ga., is President.

*Buffalo, Rochester & Pittsburgh.*—Between 350 and 400 men are at work grading the new cutoff of 5½ miles between Lane's Mills and Falls Creek, Pa. (See this column for Aug. 27.) In addition, a large force of masons is employed in putting in heavy abutments and pier masonry for steel bridges. The contractors have two steam shovels at work in a heavy summit cut, besides three locomotives and 100 dump cars. William E. Hoyt, of Rochester, N. Y., is Chief Engineer.

*California Southern.*—It is reported that work has been begun on this road to run from Kramer, in San Bernardino County, Cal., a point on the Atlantic & Pacific, north 27 miles to Randsburg. A. A. Dougherty, Los Angeles, Cal., is President.

*Canadian Pacific.*—J. L. Doupe, C. E., has left Winnipeg, Manitoba, for Wabigoon to make a locating survey of the route of the steam tramways on the approaches between Lake Wabigoon and Lake Manitou and thence to Rainy River. (See this column for Sept. 10.) It is intended to begin building this season.

*Carthage.*—There are 140 men at work on the extension of this line from Carthage, north, about 12 miles, to Island Ford, N. C. Grading has been completed between Carthage and Moonshanner and track has been laid and ballasted completed to McLendon's Creek. The work is being done by convicts from the North Carolina penitentiary. It is expected that connection will be made with the Durham & Charlotte by Dec. 1. The present road runs from Cameron, N. C., west and southwest by way of Carthage to Curriersville, 21 miles. W. C. Petty, Cameron, N. C., is Lessee and General Manager.

*Central of Georgia.*—This company has purchased 5,000 tons of 80-lb. Am. Soc. C. E. pattern rails. About 35 miles will be laid on the line between Macon, Ga., and Atlanta and the balance between Columbus and Birmingham, Ala. The greater part of the rails have been received and the balance is loaded for shipment.

*Columbia Southern.*—The first 10 miles from Biggs, Ore., to Wasco was opened for traffic Oct. 3. (See this column for Sept. 3.) It is proposed to extend the road about 120 miles to Prineville.

*Columbus, Sandusky & Hocking.*—This company has purchased 500 tons of Am. Soc. C. E. standard 70-lb. rails for relaying its track north of Fultonham, O. S. M. Felton, Columbus, O., is Receiver.

*Delaware, Lackawanna & Western.*—This company, according to report, is surveying for an extension from the main line near the Delaware Water Gap, Pa., south about 30 miles through the slate regions, to connect at Riegelsville with the new Quakertown & Easton.

*Duluth & Iron Range.*—A short spur of this road from Biwabik, Minn., west two miles to the Roberts mine, near McKinley, has been completed. The first ore was shipped Aug. 7.

*Duluth, South Shore & Atlantic.*—This company has completed the standard gaging of the Mineral Range, a division of this company's road, which runs from Houghton north 15 miles to Calumet, Mich.

*Erie Eastern.*—This road has asked the city of Erie, Pa., for a franchise to use certain city streets and docks. The proposed line within the city is to run from Cranberry street at or near Tenth street north across a number of streets to the Bay of Presque Isle, with the right to diverge northeast across such streets as are necessary to bring the line to Front street. A further condition of the request is that the Pittsburgh, Bessemer & Lake Erie shall have the right to run its trains over the tracks of this company. The road is projected to run from Erie south, 21 miles, to a connection with the Erie Railroad at or near Mill Village, Pa. The surveys have been completed and the company expects to begin building this fall if possible. The right of way is mostly secured. The construction work will be light. There will be two steel bridges, one of 60 ft., the other 100 ft. The road will be bonded for \$10,000 per mile. Contractors can gain full information by addressing R. G. Matthew, Local Manager, at Erie, Pa.

*Hot Springs Terminal Railway.*—Surveys have been made and most of the grading completed for this road, which is to comprise five miles of terminals at Hot

**Hot Springs, Ark.** The grades will not exceed  $1\frac{1}{2}$  deg. There is one span of 50 ft. to be bridged. The Hot Springs Terminal Railway Co. was incorporated in July (see this column for July 30). Its organization was found necessary to put into operation an order of the United States Courts to Receiver John G. Lonsdale, of the Little Rock, Hot Springs & Texas, to employ engineers to make estimates, etc., for the completion of that road and to negotiate the sale of receivers' certificates as a means of raising necessary money for the building. The officers of the Hot Springs Terminal Railway will be found in another column.

**Hutchinson & Southern.**—It is reported that the contract has been let for building the extension from Medford, Okla., east about 25 miles to Blackwell (see this column for July 23). The citizens of Blackwell and along the line give the company a subsidy of \$2,000 per mile.

**Kansas City, Osceola & Southern.**—President Conrad Miller is about to let contracts for an extension from Osceola, Mo., southeast 40 miles to Bolivar. (See this column for Aug. 6.) The road will be through a rolling country with only one heavy rock cut of about 60,000 cu. yds. The bridge work will be light, comprising two spans each 150 ft. long, and several plate girder spans. Chief Engineer Hinkley is making the final locating and cross-section surveys.

**Nashville & Knoxville.**—The survey for the extension of this road from Lebanon west about 30 miles to Nashville, Tenn., was completed Oct. 2. R. J. Moscrip, Cookeville, Tenn., is Engineer in charge.

**New Roads.**—The R. Connor Co., of Marshfield, Wis., is reported to be about to build eight miles of logging road from their mills at Stratford southeast to the Opp-line mill.

A contract for building a road from Greenwood, Wis., to the property of the N. C. Forest Lumber Co., is reported to have been let by that company to Winston Bros., of Minneapolis.

**New York & Ottawa.**—The plans of this company to extend its road south from Tupper Lake to connect with the Delaware & Hudson at North Creek have received a check. The New York State Forest Preserve Board has taken possession of eight miles of the proposed roadway in Township 15, the express purpose being, according to the Board, to head off the building of another road through the Adirondacks.

**Orange, Call & Pine Belt.**—This company, whose incorporation was noted in this column Sept. 24, has begun to build its line. The road as projected is to run from Salem, Tex., north through Call and Orange to Jasper, 75 miles. About 75 men are now at work. The country is level and no bridges are required. All the material, including rolling stock, has been bought for the road. The names of officers will be found in another column.

**Pennsylvania.**—Surveyors are reported to be at work laying out a branch from the Trenton Cutoff, near Horsham, Pa., to Willow Grove.

The Board of Directors of the West Jersey & Seashore line of this company has approved a proposition to double-track the Camden & Atlantic Division, and to lay both tracks with 100-lb. rails. This road runs from Camden, N. J., east 58.7 miles to Atlantic City. The company has purchased 40,000 tons of rails at \$19 per ton for 30-ft. rails and \$20 for 60-ft. rails, to be used in this work. The contracts were awarded to the Pennsylvania Steel Co., the Cambria Iron Co. and the Carnegie Steel Co., and all the rails are to be delivered before Jan. 1.

**Pittsburgh & Eastern.**—Engineers of this company have begun locating the right of way and it is stated that the road is to be built soon. This company was incorporated some time ago to build a road from Mahaffey, Pa., southwest about 115 miles to West Newton. Of this 12 miles from Mahaffey to Fuller Run have been completed. It will intersect the Pittsburgh & Lake Erie at West Newton and according to reports is to be operated as a part of that road. C. C. Watts, 458 Bullitt Building, Philadelphia, is President, and J. C. Patterson, Mahaffey, Pa., Chief Engineer.

**Shreveport, Center & Gulf.**—This company has been incorporated in Texas to build a line from Brooklyn on the Sabine River opposite Logansport, La., southwest, about 10 miles, to Center, Tex.

**Sierra (Cal.).**—According to report, this company expects by the middle of October to have its road completed and in operation from Oakdale to Jamestown, Cal., 41 miles. The stations in their order from Oakdale are as follows: Occidental, 6 miles; Paulsell, 11 miles; Warnerville, 18 miles; Hooperton, 20 miles; Rosascaes, 26 miles; Don Pedro, 29 miles; Chinese, 35 miles; Jamestown, 41 miles. As projected, the line is to extend from Oakdale on the Southern Pacific, northeast to Sonora, and thence northwest to Angel's Camp. W. S. Bullock, San Francisco, is General Manager.

**South Carolina & Georgia.**—This company is planning to extend its line from Augusta, Ga., southwest about 150 miles to Albany, a point on the Central of Georgia. It has purchased the Oconee & Western, which extends from Dublin to Hawkinsville, 40 miles. From Hawkinsville to Cordele it is proposed to build a new line, and people along the line will be asked for aid. From Cordele to Albany, 35 miles, it is proposed to use the tracks of the Albany Northern. The company is also trying to purchase the Wrightsville & Tennille, which extends from Dublin northeast 36 miles to Tennille, but has not yet succeeded in getting the Central of Georgia to sell its stock in that road. At Empie the company will have an outlet over the Southern. The South Carolina & Georgia now runs from Augusta, Ga., east to Charleston, S. C., 137.5 miles, with numerous branches.

**Southeastern Ohio Black Diamond Belt & Terminal.**—This company was incorporated in Ohio Oct. 6, with a capital of \$100,000, to build a line from Ripley, Brown County, O., northwest to Pohatagan, Belmont County, with numerous branches and side lines. This is another portion of the Black Diamond system, of which Albert E. Boone, of Zanesville, O., is a promoter.

**Union Pacific.**—It is reported that this company is replacing 130 miles on the Nebraska Division with new rails, and that the roadway between Columbus and Grand Island, Neb., 62 miles, is being reballasted.

**Vandalia.**—V. T. Malcott, Receiver, has contracted, according to report, for 20 miles more of 85-lb. rails to be used on the main line. This makes 61 miles in all purchased since he was appointed Receiver. The rails taken up are used in replacing lighter rails on other divisions and in laying new side tracks.

**Wheeling & Lake Erie.**—An official communication from this company summarizes the most important of

the improvements made and being made on the line since Jan. 1, 1897, as follows: Five thousand tons of 70-lb. steel rails have been purchased, of which 3,000 tons have been laid; 125,000 renewal ties have been put in, two miles of extension of main track in Martin's Ferry in progress (see this column for July 23), and 15 miles of new sidings constructed and in progress. Twenty seven spans, requiring 6,000,000 lbs. of steel bridging, are under construction, with the necessary masonry for same. Four of the 10 spans across Maumee River have been filled and the filling protected with heavy wall of rip-rap stone, and the remaining six spans are being reconstructed in steel. All new bridges are designed to carry 126-ton engines.

At Fremont, O., the company has nearly finished a new \$4,000 brick station building. Seven hundred linear feet of dock front are being rebuilt at Huron. A 100,000-gallon water station at Columbia, O., and a 50,000 gallon water station at Huron, O., have been completed. A 40,000-gallon water station at Williston, O., is under construction. Three steam shovels were engaged during the entire season filling trestles. All the structures of the road are being repainted. Road marks and station signs have been put up over the entire line. An additional telegraph wire has been strung between Toledo and Massillon. New yards are being built at Homestead and Huron, each with a capacity of 600 cars. A new turntable and engine-house and a rapid coal-handling plant have been completed at Huron. Considerable ballasting has been done.

At shops off the line during the spring and early summer the company had 303 box cars rebuilt, 50 gondolas converted into box cars, and capacity increased to 50,000 lbs., 52 gondolas rebuilt and capacity increased to 50,000 lbs., and there are now being converted into box cars 200 gondolas coal cars, of which the capacity will be 50,000 lbs. Besides which the company's own shops are keeping up the running repairs to equipment, and in addition rebuilding and increasing the capacity of cars as fast as they can.

#### Electric Railroad Construction.

**Anderson, Ind.**—Mr. C. L. Henry, Manager of the Union Traction Co., of Anderson, writes as follows: "The company has been incorporated and proposes to build a line from Anderson via Linwood, Alexandria and Fairmount to Jonesboro, there connecting with and running into Marion over the line of the Marion Street Railway Co. The total distance to be built is 27 miles, the distance into Marion six miles further, making a total run of 33 miles. The company has a private right of way already secured for 17 miles of the route, with the exception of where it runs through the paved streets in the towns and city, and will secure private right of way for the remainder of the route. The grading is well under way between Anderson and Alexandria. No contracts for the grading or track laying are being let, the company doing the same under its own supervision. We have all our rail, ties, poles, rail bonds and overhead work purchased, as well as our cars, trucks and motors. For the interurban line we will use 60-lb. T rail, 60 ft. long, except where we run through brick paved streets in the towns, where we will use 60-lb. T rail, 30 ft. lengths, 6 in. high. Power will be furnished from the Anderson station of the Anderson Electric Street Railway Co., the stockholders of which are nearly the same as this company. We will build an additional power house somewhere between here and Jonesboro, perhaps at Summitville. It is the intention to put 15 miles of the road in operation this fall, and build the remainder next spring. The equipment of the power house, which will probably be at Summitville, has not yet been decided upon, and will not be perhaps this fall. There are no bridges or trestles of importance and no tunnels. The road is not bonded, but we have the money to pay for all that we have undertaken."

The officers of the company are as follows: President, Phillip Matter, Marion, Ind.; Vice-President, J. A. Van Osdon, Anderson, Ind.; Secretary, Ellis C. Carpenter, Anderson, Ind.; Treasurer, John L. Forkner, Anderson, Ind.; General Manager, Charles L. Henry, Anderson, Ind.

**Baltimore, Md.**—The Central Railway Co. has closed a contract with the Consolidated Railway Co. to furnish power from its Pratt street power house to run its Cannon & Wolfe street line, which will soon be placed in operation.

**Bethlehem, Pa.**—Construction work on the South Bethlehem & Hellertown Traction Railroad has been begun.

**Bound Brook, N. J.**—The Brunswick Traction Co. has been granted a franchise to build an electric road in connection with the proposed New York & Philadelphia Company's line. The Traction Company binds itself to pay the Borough of Bound Brook \$5,000 to be used in macadamizing the streets on which tracks are to be laid.

**Bradford, Pa.**—Councils have laid over until next meeting the ordinance granting the Olean, Rock City & Bradford the right to use the tracks of the Bradford Electric Street Railway.

**Buffalo, N. Y.**—The Park Side avenue line on the Buffalo Railway Co. is being extended. This will give better facilities in the East Side.

The Buffalo, Hamburg & Aurora Electric Railway Co., has been granted a franchise by the State Railroad Commissioners and construction work has been begun on the new line. Arrangements have been made to run the cars direct from Hamburg through Seneca street to Main street in Buffalo.

**Butte, Mont.**—A contract has been closed between the James Leffel Water Wheel Co., of Springfield, O., and St. Paul capitalists for six turbines of 1,000 H. P. each to furnish power for the new plant located near Butte. The plant will furnish power to several large copper mines, and probably to the street railroads of Butte.

A franchise has been asked for by the Butte Street Railway Co. for a route on Wyoming and Park streets. Protest has been made by business men on Broadway, who desire the road on that street.

**Chatham, Ont.**—The Chatham City & Suburban Electric Railway Co. desires to run north from the city through the township of Dover to Mitchell's Bay, thence to Wallaceburg and Petrolia.

**Chester, Pa.**—Council has granted an extension of two years to the Philadelphia & Delaware, and Media, Middletown & Aston railroads, both ordinances being adopted on third reading.

**Cleveland, O.**—Last week the Lorain & Cleveland Electric Railroad was opened, making the sixth suburban electric line out of Cleveland completed within the last few years. All of these electric roads compete

with one or more steam roads, which they have done to detriment of the latter. For a map showing routes completed up to October, 1896, see *Railroad Gazette* of Oct. 16, 1896.

**Danville, Ill.**—On Oct. 7 the Vermilion County Board granted a 50 year franchise to the street railroad company. Among the stockholders are W. P. Cannon, F. W. Penwell and A. C. Daniels. Part of the road has already been built.

**Gettysburg, Pa.**—Preliminary surveys are soon to be made on the proposed Washington, Westminster & Gettysburg Railway, and Mr. E. J. Lawyer, one of the projectors, is reported to have said the road will be completed in a year. A meeting will be held next month at Westminster, when, it is thought, action will be taken so that active work can be commenced.

**Greenburg, Pa.**—On Oct. 6 right of way was granted to build an electric road to connect Greenburg with the coke regions. This electric road, the Greenburg, Jeannette & Pittsburgh, will run from Mt. Pleasant to Greenburg, connecting with the Greenburg & Hempfield road in South Greenburg.

**Leamington, Ont.**—Mr. W. Stares, representing the Leamington Electric Light Co., has requested permission from the town to run electric cars within the limits of the corporation.

**London, Ont.**—It has been decided to build the extension of the electric road to Pottersburg. The estimated cost is \$7,000.

**Marcellus, N. Y.**—The Railroad Commissioners have granted permission to the Marcellus Electric Railroad to build its line.

**Middletown, Md.**—The directors of the Frederick-Middletown Electric Railroad Co. intend to erect a powerhouse, and work on it may be begun in a few days. The structure as planned will be of frame, about 74 x 94 ft., and will be located near Middletown. The present contract with Mr. Bosley, of the Frederick City Electric Light & Power Co., to furnish power for the running of the cars, expires some time in February. The site for the new building has already been staked off. Mr. C. McC. Lemley, of Baltimore, has made a preliminary survey of the proposed extension of the electric road from Middletown to Myersville, a distance of four miles.

**Montreal, Que.**—Mr. A. J. Corriveau, the promoter of the Montreal Southern Counties Railway, has lately returned from making a circuit of the proposed route. It is the intention to run the line through Chamby, Que., where the necessary power will be obtained.

**New Rochelle, N. Y.**—The New Rochelle Electric Railway Co. has been incorporated with a capital stock of \$80,000. Sufficient financial support has been received to assure its completion. Among the directors are: J. H. Starin, H. B. Stokes and H. L. Nelson. The application for the franchise will come up at the next meeting of the trustees and a public hearing will be given later.

**Newtown, Pa.**—An electric road from Newtown to Langhorne is being built by contractor G. S. W. Brubaker. The officers of the road are: President, T. P. Chambers; Secretary, George C. Worstell; Treasurer, A. Chambers; Directors, George C. Blackfan, T. S. Kenderdine, E. F. Bucklin, T. P. Chambers, E. Chambers, J. C. Hutchison, W. T. Wright, George C. Worstell and Ashbel W. Watson.

**Pelham, N. Y.**—A street railroad company has been organized in Pelham for the purpose of connecting with the New Rochelle, Mt. Vernon & Winchester Railroad, which has just been formed. The incorporators include Jacob Heisser, James W. Caffrey, Frank M. Lyons and others of Pelham.

**Penn Yan, N. Y.**—The Penn Yan & Pennsylvania Railroad Co. has filed papers of incorporation, the capital stock being \$400,000. It is proposed to build an electric road from Savona, connecting with the Rochester Division of the Erie, to Penn Yan in Yates County along the east shore of Keuka Lake. The Board of Directors include G. F. Andrews, of Owego; Charles L. Brown, of Binghamton; John M. Peck, of Bradford; D. E. Hoover, of Keuka, and others.

**Pottstown, Pa.**—Negotiations are said to be in progress between the Schuylkill Valley Traction Co. and the Pottstown Passenger Railway Co. in relation to extending the lines of the traction company from Trappe to Saratoga, there to unite with the passenger company's line. The building of this electric line would connect Pottstown with Collegeville, Norristown and Conshohocken.

**Saginaw, Mich.**—The receivers of the Union Street Railway Co. have petitioned the court for power to issue certificates to the amount of \$40,000 to relay some of the tracks. The work may be begun this fall.

**Sarnia, Ont.**—The Sarnia Observer states that a project is on foot to construct an electric railroad from Sarnia to Weisbeach.

**Titusville, Pa.**—The Titusville Electric Traction Co. has begun to lay its tracks west from East Titusville. The road construction will be very substantial and the car equipment complete. It is stated that the company has secured an option for the purchase of the Titusville & Cambridge Railroad right of way between Titusville and Cambridge. A piece of land near Pine Creek, East Titusville, has been bought upon which will be erected a power house, has been bought.

The Titusville & Langford Street Railay Co. will commence to lay its tracks this week through Titusville.

**Washington, D. C.**—It is stated that Mr. Gustave Stahl, Vice-President of the Washington & Glen Echo Railway Co., has been granted permission to build the electric lines of the company in the District of Columbia.

**Windsor Locks, Conn.**—The work on the electric road through Windsor Locks, Conn., was temporarily stopped last week by a misunderstanding between the Selectmen and the railway company. The matter has been settled, and Mr. Starr, of the Springfield & Southwestern Co., who will build the road, states that he would proceed at once with the construction. This line is part of a connecting link between the Springfield & Southwestern and the Windsor line of the Hartford St. Ry. Co.

#### GENERAL RAILROAD NEWS.

**Central Pacific.**—Holders of five per cent. bonds due 1939 are notified that in view of the maturing claim of the United States against the company a bondholders' agreement dated Oct. 1 has been prepared conferring

upon Speyer & Co., of New York, the right to represent the bonds subject to final approval of depositing bondholders without any charge to them, and holders of these bonds are requested to make deposit with the same not later than Dec. 1. Deposit will also be received by the Deutsche Bank, in Berlin, and by Teixeira de Mattos Bros., Amsterdam.

**Central Vermont.**—At an adjourned meeting of the first mortgage bondholders, held at Boston Oct. 12, it was decided by a vote of 2,771,400 shares to 676,800 to adopt the plan of the Reorganization Committee as appeared in this column for Sept. 17. The Grand Trunk Company proposes to make a contract guaranteeing interest on the first mortgage bonds and series A bonds, provided it does not require to pay more than 30 per cent. of the gross receipts from traffic.

**Chattanooga, Rome & Southern.**—At a recent meeting of the Directors, held at Rome, Ga., it was decided to issue \$500,000 in 50-year five per cent. gold bonds to pay the indebtedness of the old Chattanooga, Rome & Columbus, which it was recently organized to succeed. (See this column for July 16.) It is stated that the new company proposes to make a number of improvements.

**Colorado Midland.**—This company was incorporated in Colorado Oct. 11 as successor to the old Colorado Midland sold at foreclosure sale Sept. 9. (See this column for Sept. 17 and Oct. 1.) The incorporators are Fred P. Oelcott of Bernardsville, N. J.; James N. Jarvis, of New York; Adrian H. Joline, of Bernardsville, N. J.; Oscar Bunke, of New York, and Henry T. Rogers, of Denver. The capital stock is \$10,000,000, divided into 100,000 shares, of which 60,000 shares are preferred stock and 40,000 common stock.

**Flint & Pere Marquette.**—The Toledo & Monroe Railroad has been formally transferred to this company. (See this column for Sept. 10.) The Flint & Pere Marquette agrees to pay \$400,000 in five per cent. bonds at par to be secured by a first mortgage on all its property and rights, made in favor of the International Trust Co., of Boston. The road extends from Monroe, Mich., southwest 18.8 miles, to a point on the Ann Arbor near Toledo.

**Illinois Central.**—The earnings for August and for the two months ended Aug. 31 were reported as follows:

	August:	1897.	1895.	Inc.
Gross earn.....	\$2,180,679	\$1,655,861	I. \$524,818	
Expen. and taxes....	1,610,709	1,236,818	I. 373,861	
Net earn.....	569,970	419,113	I. 150,857	
<i>Two months:</i>				
Gross earn.....	\$4,161,754	\$3,294,485	I. \$870,269	
Expen. and taxes....	3,118,664	2,549,156	I. 569,503	
Net earn .....	\$1,046,090	\$745,329	I. \$300,761	

A mortgage of \$2,000,000 on the Chicago & Springfield division was filed in Sangamon County, Ill., Oct. 11. The bonds are to bear interest at 3½ per cent. and are to take the place of old bonds under the reuniting plan recently adopted. This division extends from Gilman Hill, to Springfield, 111.5 miles.

**Lawrence & Emporia.**—Attorney-General Boyle, of Kansas, has asked for a dissolution of the franchise of this road, a branch of the Union Pacific, on the ground that it has been abandoned since 1887. The road was built in 1881 from Lawrence to Emporia, Kan., a distance of 80 miles. The suit was instigated by persons through whose property the right of way runs that they may recover the land.

**Louisville & Nashville.**—The Court of Appeals, at Louisville, Ky., has sustained the suit of the trustees of the old Shelbyville Railroad to have the Louisville & Nashville compelled to fill out its lease of that road which has yet 15 years to run. The Louisville & Nashville guaranteed the interest on the bonds, amounting to \$250,000, but has refused to pay the interest for 12 years.

**Monterey & Mexican Gulf.**—Judge Chapital, of the Federal District Court, at the City of Mexico, Mexico, has granted a stay of proceedings in the case of this company, which was ordered to deposit \$4,060,000 as a guarantee to creditors. The property of this company was attached several months ago (see this column for Jan. 1), and Manuel Commeras was appointed Receiver. The line extends from Venadito 387 miles to Tampico, and was built by American contractors. A number of Americans are among the creditors.

**New York Central & Hudson River.**—The gross earnings of this road and its leased lines for September, 1897, were \$4,458,919 against \$3,908,492 in 1896, an increase of \$55,427. The gross earnings for the quarter ending Sept. 30, 1897, were \$12,413,811 against \$11,269,899 in 1896, an increase of \$1,143,912.

**Northern Pacific.**—The earnings for August and for the two months ended Aug. 31 were reported as follows:

	August.	Two months.	
Gross, earn.....	\$1,828,560	\$3,665,921	
Oper. expen.....	1,088,347	2,158,613	
Net earn.....	\$740,213	\$1,530,308	
Taxes.....	42,900	80,800	
Surplus.....	\$697,313	\$1,441,508	
Other income.....	2,800	5,535	
Total net income.....	\$700,113	\$1,450,043	

**Oregon Improvement.**—Pursuant to decrees by the Circuit Court of the United States Eben Smith, Master Commissioner, will sell at action at Seattle, Wash., Nov. 6, all the property, rights and franchises belonging to this company. The conditions are that each bidder shall have deposited cash or certified check to the sum of \$100,000, and that the successful bidder shall pay 10 per cent. of his bid at the time of its acceptance and the balance within 30 days from the confirmation of the sale.

**Pennsylvania Co.**—Notice is given to holders of \$2,600,000 of St. Louis, Vandalia & Terre Haute second mortgage seven per cent. bonds, maturing May 1, 1898, and \$2,109,000 of Erie & Pittsburgh consolidated mortgage seven per cent. bonds maturing July 1, 1898, that the Pennsylvania Company will purchase the same upon presentation to Robert W. Smith, Treasurer, at the general office in Philadelphia.

**Philadelphia, Newton & New York.**—This company, whose lines are operated by the Philadelphia & Reading, has defaulted on the interest due Oct. 1 on its first mortgage five per cent. bonds (\$1,480,000 outstanding). These bonds were guaranteed by the old Reading Company, but this guarantee seems to have expired when that company went out of existence. The new Reading Company owns \$349,100 of these bonds. The default is said to be due to the loss of business from parallel trolley lines and it is claimed that the company is earning scarcely more than two per cent. on its bonds.

**Pittsburgh, Bessemer & Lake Erie.**—The Enterprise Mining Co., operating coal mines near Grove City, Pa., has entered a suit for damages against this company as the successor of the Pittsburgh, Shenango & Lake Erie for about \$30,000. This case grows out of the suit for alleged discrimination in freight rates.

**Portland & Rumford Falls.**—Holders of 10-year debenture bonds dated June 1, 1894, are notified that in accordance with the provisions contained in the bonds they will be paid by the company at the office of Kidder, Peabody & Co., Boston, or at the office of the Portland Trust Co., Portland, Me., on and after Dec. 1, 1897, with interest to that date, after which time all interest will cease.

**St. Louis Southwestern.**—A special stockholders' meeting will be held Nov. 4 at St. Louis to consider the proposition to aid the Gray's Point Terminal Railway Co. to build its extension of the St. Louis Southwestern to Gray's Point on the Mississippi. It is proposed to guarantee the principal and interest on 50-year five per cent. gold bonds of the Gray's Point Terminal to the sum of \$15,000 per mile and in consideration that the St. Louis Southwestern either purchase or acquire by consolidation, lease or otherwise the Gray's Point Terminal Railway Co.

**Union Pacific.**—Holders of six per cent. gold collateral trust notes for this company are notified that J. P. Morgan & Co., depositaries, are prepared to pay 27½ per cent. in addition to a previous demand of 30 per cent. on the principal of these certificates on Oct. 22. (See this column, Sept. 17.)

The earnings of the entire system and of the Union Pacific proper for August and for the eight months ended Aug. 31 were reported as follows:

	ENTIRE SYSTEM. <sup>1</sup>		Inc.
August:	1897.	1896.	I. \$457,846
Gross earn.....	\$1,965,696	\$1,507,850	I. 214,851
Oper. expen.....	1,182,721	968,179	I. 214,851
Net earn.....	\$782,975	\$530,680	I. \$243,295
<i>Eight months:</i>			
Gross earn.....	\$11,609,691	\$10,065,951	I. \$1,513,619
Oper. expen.....	7,713,712	6,787,130	I. 931,561
Net earn.....	\$3,890,889	\$3,278,801	I. \$612,088
	UNION PACIFIC PROPER.		
August:	1897.	1896.	Inc.
Gross earn.....	\$1,625,876	\$1,316,697	I. \$309,179
Oper. expen.....	994,015	87,570	I. 186,443
Net earn.....	\$631,861	\$569,127	I. \$22,734
Gross earn.....	\$9,746,396	\$8,726,042	I. \$1,20,354
Oper. expen.....	6,425,016	5,655,501	I. 769,555
Net earn.....	\$3,321,340	\$3,070,541	I. \$250,799

United States Attorney-General McKenna makes a statement with reference to the foreclosure of this road in which he says that under the first agreement the United States was guaranteed a bid of \$45,754,661 in the foreclosure proceedings. This amount included the sinking fund and about \$28,500,000 additional. After the court had made this decree the Government became dissatisfied because the court had refused to admit certain claims made by the Government and the Government proposed them to make an appeal. The Reorganization Committee learning this came forward with an increase to make the total guarantee \$50,000,000, and under these conditions the Government decided to accept the offer.

**Wabash.**—Judge Taft, of the United States Court, at Toledo, O., on Oct. 6 entered a decree ordering the Wabash, St. Louis & Pacific, a division of the Wabash, to pay to James Crompton \$532,202 within 10 days from the date of filing. (See this column for July 23.) In default of payment that part of the road between Toledo and the western boundary of Ohio is ordered to be sold to meet the payment.

#### Electric Railroad News.

**Chicago.**—The Englewood & Chicago Electric Street Railway Co., which has been in the hands of Mr. G. H. Condit as Receiver for some time, has been bought in by the bondholders and the company reorganized. Recently considerable attention has been directed toward this road. About 20 cars have been running, since June and the results of tests thus far have proved its economy. For full particulars see descriptive article in our issue of Sept. 3.

The case of the City of Chicago vs. the General Railway Co. has been taken to the Supreme Court. A brief filed by the company is in support of the claim that the mileage tax imposed upon it by the ordinance under which it operates cannot legally be collected.

The Metropolitan West Side Elevated R. R., Chicago, commenced running trains around the Union Loop early Monday morning, Oct. 11.

**Cleveland, O.**—At a meeting of the Town Council Committee last Friday a resolution was passed regulating the granting of franchises in the city. Under the new proposition the street railroads must give six tickets for a quarter, universal transfers, pay five per cent. of their gross receipts into the City Treasury and pave the streets between the tracks. In return the city is to extend all franchises to 1914.

**Lanark, Ont.**—At a public meeting held recently a resolution was passed favoring the granting of a bonus of \$10,000 to the Lanark County Electric Railway.

**New York.**—Several new cars are running on the Lenox avenue conduit electric road and more will be added in a short time. Between each of the windows on the new cars there is an electric button for the use of passengers to signal to the conductor.

**Peoria, Ill.**—The Central Railway Co. has withdrawn its ordinance for a 50-year franchise under the privileges granted by the new Allen law to build an electric railroad in Peoria. The opposition to granting this franchise was very strong among the citizens and was the first attempt to secure authority to build an electric road under the Allen law.

**Philadelphia.**—The Union Traction Co. is placing vestibules for the motormen on all its winter cars.

**Wheeling, W. Va.**—The Moonville, Benwood & Wheeling Railroad Co. has passed out of the Receiver's hands, new arrangements having been made to cancel the entire indebtedness against the road and to place it under new management. It is believed that the road will be put in operation and additional equipment will be added very soon.

#### TRAFFIC.

##### Traffic Notes.

The Chesapeake & Ohio accepts coupons of the Central Passenger Association interchangeable mileage tickets.

The Joint Agent of the Trunk Line and Central Traffic roads, who validated the G. A. R. excursion

tickets at Buffalo last month, had 463 tickets left on his hands.

The Board of Managers of the Joint Traffic Association has declined to take action on the complaint of competing roads concerning the running of free chaircars by the Wabash between Detroit and Buffalo.

Eastbound all-rail grain and flour rates have been advanced 2½ cents to the basis of 22½ cents from Chicago to New York, taking effect Oct. 15. An advance in rates by lake and rail is noted in our Chicago letter.

The injunction against the State Railroad Commissioners of North Dakota in the matter of reduced rates for the railroads, which they have prepared, has had to be postponed in consequence of the low condition of the State Treasury. The Attorney-General has his answer ready, but he had no funds with which to begin taking testimony. After the taxes come in, about Nov. 1, he will be ready to go on.

The Union Pacific and the Oregon Short Line have reached an agreement by which, it is said, through traffic arrangements, and presumably through passenger trains, will be restored over these roads between Omaha and Oregon, but no particulars are given out. The rupture between these roads resulted, it will be remembered, from the refusal of the Union Pacific to continue the long-standing agreement under which the Oregon Short Line received more than its pro rata share of the earnings on through business. Since the discontinuance of through rates the Oregon Short Line has thrown most of its Eastern business over to the lines through Salt Lake City.

#### Chicago Traffic Matters.

CHICAGO, Oct. 13, 1897.

Roads in the Central Passenger Association, at the regular monthly meeting held last week, definitely decided to make several important changes in the interchangeable mileage ticket now in use. It is thought some modifications can be made which will permit more convenient use of exchange tickets. The plans will be taken under advisement and some one of them adopted at the next regular meeting of the mileage bureau. In the meantime the roads operating through car lines and desiring to issue interline tickets are authorized to make such mutual arrangements as they desire.

Flour and grain product rates are to be advanced 2½ cents on October 25, from St. Paul and Minneapolis, by lake and rail to New York; making the flour rate from the Northwest to the Atlantic seaboard 25 cents. Beginning 10 days earlier (the 15th) the rates from Duluth and from Chicago will also be advanced a corresponding sum, making the rate from Duluth to New York 20 cents, and from Chicago and Milwaukee 17½ cents.

The lines in the Central Passenger Association have voted to change the day of holding their monthly meeting from the first Wednesday of each month to the second.

Southwestern lines are to meet in St. Louis, on Oct. 18, to try and bolster up Texas freight rates, which are in bad shape and causing the Western roads uneasiness.

The Western Passenger Association has granted cheap fares to the Chicago Merchants' and Travelers' Association for an extra session of that organization which is to be held in this city Nov. 3-10.

The Northern Pacific, Great Northern and Canadian Pacific roads have been asked by Chairman Caldwell to immediately withdraw any arrangements they may have made whereby regular passenger fares in the territory may be reduced. Tests of the market developed the fact that the lines named were cutting rates to North Pacific coast points an average of \$5.

The Nickel Plate road has asked the managers of the Joint Traffic Association for authority to establish a new differential line to New York over its line and the New York Central. The Michigan Central and the Lake Shore also want differentials over the West Shore, claiming they are entitled to such an arrangement under the recent award of the arbitrators to the Panhandle, which uses the Pennsylvania road, a strong line, east of Pittsburgh.

The Burlington road has announced a radius cut in rates on freight to Colorado common points from the Missouri River. The tariff filed is as follows, compared with the old rates:

Class.	3d.	4th.	5th.	A.	B.	C.	D.	E.
New.....	5)	39	32	44 <sup>1</sup>	31 <sup>2</sup>	23	18	13
Old.....	80	65	60	60	40	40	35	30

Commodity rates from Chicago and Peoria are also correspondingly cut. This notice was quickly followed by similar ones from the other lines, and so all freight rates to Colorado are likely to be in bad shape until the lines from New York via Galveston and New Orleans restore tariffs to a normal basis. It is said that the cutting on Colorado rates is not all done by the steamers, but partly by the railroads leading from the Gulf to Denver.

Freight on the roads west of this city continues heavy and the majority of the lines have all they can handle both ways. With most of them they might increase their business had they the cars to handle it. There has never been a time when the general traffic was so heavy and was conducted with as little friction. There are no blockades anywhere. In the Northwest the grain movement is only limited by the ability of the railroads to furnish cars, and is expected to continue as long as the weather is good. In 10 weeks 100,000,000 bu. of flour and grain have been delivered in Chicago, the largest deliveries on record.

Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western termini of the trunk lines for the week ending Oct. 7 amounted to 57,095 tons, as compared with 57,331 tons the preceding week. This statement includes 20,099 tons of grain, 2,038 tons of flour and 10,757 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING OCT. 7.		WEEK ENDING SEPT. 30.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio.....	4,395	7.7	3,9,5	6.8
C., C., C. & St. Louis.....	2,949	5.2	4,477	7.8
Erie.....	8,675	15.2	5,408	9.4
Grand Trunk.....	6,414	11.2	6,633	11.6
L. S. & M. S. ....	5,699	10.0	5,636	9.8
Michigan Central.....	6,283</			